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Full Steel Production of First Importance

Trade Commission Makes It the Chief Factor in Price Fixing—Contract Abrogation Not an Issue—Pomerene Bill Will Wait

WASHINGTON, Dec. 18.—The Federal Trade Commission does not intend to be held responsible for the failure of the War Industries Board to revise the schedule of controlled prices of iron and steel which will expire on Jan. 1. In order that the war board may have the matter entirely in its own hands extraordinary efforts have been made to complete the investigation of costs undertaken in August, and the final report, based on data covering conditions in the industry up to Oct. 31, has been finished and will be transmitted to the board forthwith. Notwithstanding the expeditious manner in which the commission has completed this important work and the fact that its cost sheets were submitted during the past week to the accounting experts of a number of the largest of the steel manufacturing concerns, the impression is gaining strength here that there will be no important revision of the existing schedules on Jan. 1. It has also become an absolute certainty that the Pomerene steel control bill cannot become a law by Jan. 1 and it is more than likely that it will not reach the Senate before February, even should the Committee on Interstate Commerce decide to report it favorably.

The session between the trade commissioners and the chief accountants of the steel men held on Dec. 14 proved fairly harmonious. There was no discussion whatever of prices and very little concerning the effect which the cost findings of the commission's experts might have upon the standing schedule promulgated in September. In order that there might be no misunderstanding regarding the purpose of the meeting and especially that it might be fully comprehended that no extraordinary efforts are being made by the commission to bring about a revision of the existing prices, Commissioner Davies made a formal statement regarding the conference.

Commission's Meeting with Steel Accountants.

"The Federal Trade Commission," he said, "upon the direction of the President, made an exhaustive investigation into the costs of production of iron ore, coke, pig iron, steel and numerous steel products for the first half of the year 1917, including the months of June and July. These cost figures were furnished to the War Industries Board for consideration in connection with the agreement on prices which the War Industries Board made with steel companies early in the autumn, and which prices under that agreement were to continue until Jan. 1, 1918. The commission has continued its investigations of steel costs since that time. The most recent available records at the present time are for the month of October, which were not generally available until the end of November.

The work of compiling these costs is enormous, requiring as it does consideration of some 8,000 cost sheets.

"The meeting with the steel producers' accountants was held pursuant to the general practice of the commission. Prior to the findings of its costs upon lumber, cement, copper, oil, and other commodities, in each instance the commission has held a hearing with the industry involved for a critical discussion of its findings before submitting the results to the price fixing body. The meeting with the steel men was for the purpose of general discussion of costs and the increases or decreases in costs shown in contrast to the months of June and July, and was of a general character. Invitation was extended to those engaged in the steel industry to confer with the commission with reference to costs disclosed in the records or any other considerations affecting costs which they might desire to present at that time."

Steadily Rising Steel Costs

As the result of developments the details of which have not yet been fully disclosed, the commission's views concerning several phases of the steel price fixing question have undergone important modifications since the completion of its cost sheets embodying the October returns obtained by its experts. The data gathered by the commission show steadily mounting costs of production, month by month, throughout the period from April 1 to date and covering practically every item of expense with the exception of such materials as nonintegrated concerns have been able to purchase at controlled prices since the September schedule was issued. These increases have not been uniform by months nor have they affected uniformly all steel producers. Since September the controlled prices have exercised an important influence upon all producers obliged to buy their own coke, pig iron, billets, or other raw or basic materials; and while there has been complaint of the small "spread" between pig and plates and shapes, nevertheless the influence of the fixed prices has been potent. In its report to the War Industries Board the commission will freely acknowledge the general upward tendency of costs since last spring. Whether it will attempt to draw any conclusions therefrom remains to be seen, although the commissioners assert very positively that their function has nothing whatever to do with price fixing and that their reports as to costs are absolutely colorless and made without accompanying suggestion of any kind.

Another development in the situation is a marked change in the commission's attitude with respect to the reasonableness of the schedule of controlled prices promulgated in September. Up to a very recent date these

figures have been sharply criticised by members of the commission, not only as being too liberal but as not being justified by the costs of production as determined in the commission's preliminary report transmitted to the President and laid before the War Industries Board as the basis of its original conferences with the steel men. One member of the commission recently expressed the opinion that the commission's figures were wholly ignored by the War Industries Board and that the steel men scored a decided victory in the contest with the board. The suggestion was also made that the relation of prices in the September schedule was distinctly favorable to the big producers.

Full Production More Important Than Prices

All this is now changed. Any reference to the previous attitude of the commissioners is met with an emphatic disclaimer and it is declared that "the Federal Trade Commission and the War Industries Board are doing good team work in the task of winning the war." No further criticisms of the September schedule are heard. It is perhaps significant, especially with reference to the work of the commission in "winning the war," that commissioners are now emphasizing the fact that any form of price fixing must be a failure that "does not accomplish the Government's purpose of developing maximum production." In this connection attention is being called to the fact that the well integrated concerns can furnish material of all kinds at prices that cannot be met by smaller concerns, especially those which must buy their pig iron. The fact that a living price to the small producer must necessarily involve a very generous profit to the completely integrated concern appears now to be accepted by the commission with a fair degree of philosophy.

The commission's original attitude, as expressed by Mr. Davies before the Senate Committee on Interstate Commerce, in favor of the abrogation of outstanding contracts made at prices differing materially from the controlled schedule, has also undergone revision. In fact, members of the commission are now disposed to contend that Mr. Davies' statement to the Senate Committee did not go so far as to constitute a definite recommendation for the cancellation of contracts. This modified position is probably due to two causes. The first is the fact that the bulk of the contracts referred to by Mr. Davies in his statement to the Senate Committee, covering a period of six months, will expire in the near future, thus reducing the issue to an academic question that will speedily work itself out.

The other reason, however, is more significant. Some time ago the commission sent out a circular to a large number of producers and consumers of steel products asking views as to the advisability and the probable effect of abrogating existing agreements. Many answers to these inquiries have been received, but in spite of every effort that has been made to classify and digest them the commission finds itself unable to draw any conclusions therefrom except that each individual replying is moved solely by his personal interest, according as he is or is not at present the beneficiary of a favorable contract. It is not even possible to deduce from the replies received whether the abrogation of existing agreements would assist or injure the majority of the producers and consumers either taken as a single group or as two separate interests. Under these circumstances it is not surprising that the commission should place no special emphasis at this time upon Commissioner Davies's former remarks on this subject.

The Pomerene Bill's Prospects

The prediction recently made in this correspondence that the Pomerene bill would not be passed before Jan. 1 has now been practically fulfilled. Congress today will take the usual holiday recess, reconvening on Jan. 3. During the two and a half weeks of the session

since convening on Dec. 3 the Senate has devoted its time chiefly to the consideration of the Webb export trade bill reported from the Committee on Interstate Commerce in the custody of Senator Pomerene and all the leading members of that committee have given it their undivided attention, as the result of which it has been passed by a decisive majority. This work has precluded the giving of any time to the consideration of the steel control bill and the subcommittee having it in charge is understood to have deferred devoting any time to it until after the holiday recess. Appropriation bills will then demand almost continuous consideration and it will require vigorous work to bring the Pomerene bill into the Senate. Its place on the calendar will necessarily be unfavorable but that disadvantage would be fully offset should the President determine that the passage of the measure is an essential part of the war program. The eyes of all interested parties therefore are on the White House and any conferences the President may hold with the War Industries Board on this matter will be followed with the deepest interest.

W. L. C.

Steel Specialties Companies Are Consolidated

The Edgar T. Ward's Sons Co., with offices in Boston, New York and other cities, has been incorporated under the laws of Massachusetts with an authorized capital of \$2,500,000 and the following officers: Edgar Ward, Newton, Mass., president; John Ward, Lynnfield, Mass., treasurer; Herbert W. Lockwood, South Orange, Mass., secretary; James S. Winn, Evanston, Ill., vice-president; Leslie Edgcomb, Philadelphia, vice-president; Arthur J. Lockwood, Glenridge, N. J., chairman; E. P. Hall, Collingswood, N. J., assistant treasurer; William E. Adams, Boston, clerk; Frank K. Biggs, New York, director; E. B. Lapham, Evanston, Ill., director. The company is a consolidation of the following concerns: George Nash Co., New York and Chicago; Field & Co., Inc., Philadelphia; Dilworth-Lockwood Co., New York and Newark, N. J.; Edgar T. Ward's Sons, Boston, and Boston Steel & Wire Co., South Boston, Mass. Offices and warehouses are still maintained at the former addresses, but the entire business is under one name and management with head office at Boston. Stocks include a wide range of steel specialties, including tubing, shafting, tool steel, electric sheets and alloy steel.

Abell-Howe Co. Expanding

The Abell-Howe Co., 565 Washington Boulevard, Chicago, distributor of American high speed chain, Howe tongue elevated trucks, electric cranes and hoists, has established branch offices at 30 Church Street, New York, in charge of J. R. Shays, Jr.; at 5086 Jenkins Arcade, Pittsburgh, in charge of C. W. Wheeler and Wayne Paulin, and at 803 Ford Building, Detroit, in charge of H. G. Bates. The company is also represented, in connection with the sale of Howe trucks, at Boston by the Boston Steel & Mfg. Co., and in the Atlantic Coast States, Pittsburgh and Cincinnati territory by the Howe Scale Co. and J. S. McCormick Co. In addition it is represented in New England by the Watkins Engineering Supply Co., Boston, and in the Northwest by Frank J. Rose Co., Minneapolis, for the sale of American high speed chain.

Nine ships, aggregating 45,115 tons, were launched during September in Japanese yards, constituting a record. These are part of a program for building shipping amounting to 300,000 tons during the fiscal year ending with April, 1918, of which 35 vessels aggregating 154,727 tons have already been launched.

The Nagle Corliss Engine Works of Erie, Pa., builder of air compressors, vacuum pumps and engines, has opened an office in the Bourse Building, Philadelphia.

CRANES FOR FLEXIBLE LOADS

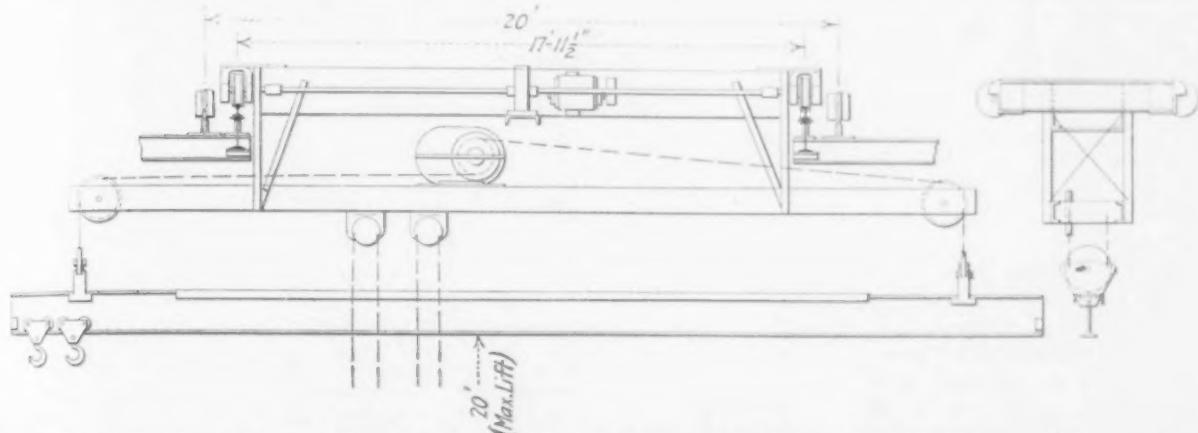
Auxiliary Girder Supports Carrying Beam—Transverse Travel on Roof Trusses

CRANES designed to handle long, flexible pieces of steel requiring supports at various points and to travel crosswise of the shop have been installed in the new fabricating shop of the Ferguson Steel & Iron Co., Buffalo. They were made by Pawling & Harnischfeger Co., Milwaukee, and are of the type illustrated. They ride rails supported by the roof trusses and the spacing of these limits the bridge spans to 17 ft. 11½ in. The

loaded trucks go down grade and the empty trucks up grade. The trucks are fitted with roller bearings and move along easily when fully loaded.

Strength of Oxy-Acetylene Welded Joints

A series of tests of the strength of oxy-acetylene welded joints in mild steel plates has been completed by the Engineering Experiment Station of the University of Illinois under the direction of H. F. Moore, research professor of engineering materials, and is described in its Bulletin No. 98. For joints made with no subsequent treatment after welding, the joint efficiency for static tension was found to be about 100 per cent for



The Cranes Are in Alternate Bays and Travel Across the Shop on Rails Supported by Roof Trusses. The carrying beams have sufficient span to serve adjoining bays

length of material handled, however, makes desirable a spread between pick-ups of approximately 33 ft. and this is accomplished by an additional box girder suspended from the crane bridge and supporting the carrying beam. On the girder are mounted the hoist mechanism and controllers, which are operated from the floor, one being for the trolley and the other for the bridge. As many trolleys as necessary can be mounted on the carrying beam. When picking up a load the beam and trolley are lowered so that chains can be passed beneath the load and hooked to the trolley. The cranes are located in alternate bays and are of 3 and 5-ton capacity.

One side of the assembling end of the shop is equipped with two traveling jib cranes for handling riveters, and also for handling material from the buggies or trucks. These traveling jib cranes have reversible motors operated from the floor. Their runway is 160 ft. in length. Cantilever cranes for various punches and other machines are located along both sides of the shop. These and the jib cranes were made by the Ferguson Steel & Iron Co.

Longitudinal movement of material is by buggies which run on 3-ft. gage tracks extending the full length of the shop. The tracks are laid with a down grade from the warehouse to the assembly shop, so that the

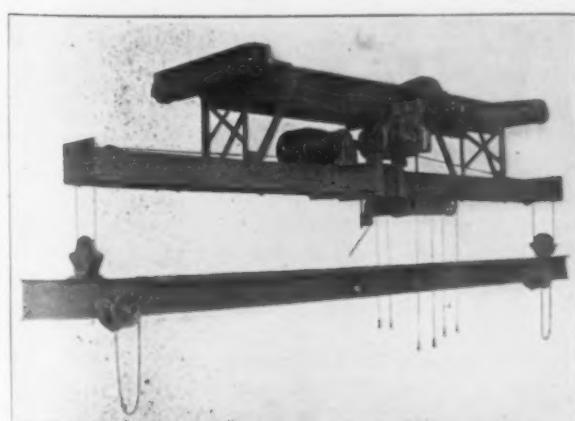
plates $\frac{1}{8}$ in. in thickness or less, and to decrease for thicker plates. For static tension tests, the efficiency of the material in the joints welded with no subsequent treatment was found to be of not greater than 75 per cent. The joints were strengthened by working the metal after welding and were weakened by annealing at 800 deg. C. For static tests and for repeated stress tests, the joint efficiency sometimes reached 100 per cent; the efficiency of the material in the joint was always less. This, the bulletin points out, indicates the necessity of building up the weld to a thickness greater than that of the plate. The impact tests indicate that oxy-acetylene welded joints are decidedly weaker under shock than is the original material. For joints welded with no subsequent treatment, the strength under impact seems to be about half that of the material.

In general Professor Moore believes that the test results will tend to increase confidence in the static strength and in the strength under repeated stress of carefully made oxy-acetylene welded joints in mild steel plates.

Life Insurance at Electric Controller Plant

The Electric Controller & Mfg. Co., Cleveland, has presented policies of life insurance to some 330 men and women in its employ. These policies range from \$300 to \$3,000 and all employees as soon as they have been in the employ of the company for six months will be insured with the Travelers Insurance Co., Hartford, for an amount equal to one-half year's pay. This increases by one-eighth of the annual pay every year until at the end of four and one-half years the policy has a face value equal to a full year's pay. These policies are not intended to take the place of any bonus payments on the part of the company or payments due under the workmen's compensation laws for accidents.

A remarkable array of posters was recently issued by the National Association of Manufacturers, and copies may be had by addressing the industrial publicity department of the association at 30 Church Street, New York. They have to do with the conservation of American industry and in that connection unwise labor agitation, and are designed to inform all classes of citizens as to their true relation to industry and the effect of the movement on their own prosperity.



On the Auxiliary Girder Below the Bridge Are the Hoist and Bridge Motors. This girder also supports the control apparatus which is operated from the floor

Crozier Tells of Great Progress Made

Despite Delays and Many Obstacles, Preparedness Has Advanced Further than Investigators Expected—Detailed Report of Testimony Taken by Senate Committee

WASHINGTON, Dec. 18.—There is a distinct note of optimism in the comment of Congressional leaders as the result of the disclosures made during the first week of the comprehensive investigation now being conducted by the Senate Committee on Military Affairs into the war preparations of the Ordnance Bureau, which will be speedily followed by inquiries into the progress made by the Quartermaster General's Office and other important branches of the War Department. The testimony of Maj. Gen. William Crozier, Chief of Ordnance, which has occupied four days, partly spent in executive session, and which began under the spur of pointed, if not actually hostile, questioning by members of the committee, has developed an advanced state of preparedness as to the provision of small arms, machine guns, light and heavy artillery and ammunition that even the most sanguine member of the committee had not dared to hope for.

The inquiry has made it plain that the basic fallacy underlying most of the criticism of the Ordnance Bureau—even that of experienced officers of the regular army—is the impression that appropriations by Congress can be transmuted into vast quantities of available war material in much the same way that single typical articles may be procured. As a matter of fact, it has been made to appear that the Ordnance Bureau had no funds of substantial amount, nor authority to make contracts, until the country actually became involved in the war. Owing to the niggardly policy of Congress, the arsenals were running at low speed, or were closed down, with organization disbanded, and the requests of the Chief of Ordnance for money with which to equip private plants to co-operate with the Government's manufacturing establishments had repeatedly been rejected.

Great Lesson of the War

The great lesson of the European war early recognized by General Crozier and his aides, and pointed out in their official reports published during the past two years, was the stupendous utilization of artillery and machine guns, which was undreamed of in any previous war. Realizing what the United States would be called upon to meet, the Ordnance Bureau planned for quantity production on a huge scale and in accordance with the most advanced methods of modern manufacturing practice. Opportunity was afforded for these preparations because of the time which must necessarily elapse in the training of a large force to be sent overseas, and because there were on hand half a million rifles of the best-known model for the equipment of the regular army and National Guard contingents first to go to France; and further, because the British and French governments were turning out a large surplus of machine guns and three and six-inch field guns with which they had offered to provide all the troops that could reach France before the spring of 1918.

The work of the Ordnance Bureau began with the standardization of material to secure the best possible results and the smallest practicable number of types, interchangeability being kept constantly in mind. The next step was to interest the largest possible number of private establishments in the work of manufacturing standardized rifles, machine guns, and all forms of ar-

tillery, from the 3-in. field gun to the largest howitzer. Any manufacturer will readily appreciate the difficulties of this problem, especially in view of the fact that no contract of any kind could be made until Congress had appropriated the money therefor, and will know how to appraise correctly the results obtained, as reflected in the following summary of the present status of the ordnance preparation:

Summary of Things Done

(a) Every soldier sent to France has been provided with a Springfield rifle of the most approved model, and has been trained in the use thereof, including ample target practice. Each of the cantonments where the men of the National Army are now being trained has been supplied with 10,000 serviceable Krag-Jorgensen rifles and 11,000 of the latest model Lee-Enfield rifles, chambered to use Springfield ammunition, thus giving each infantryman a good rifle. Three large establishments formerly making Lee-Enfield rifles for the British government are turning out approximately 6000 per day of the U. S. model Enfield, accurately standardized, and the rate of production will soon reach 10,000 per day, insuring that every soldier sent to France will be provided with an Enfield rifle, the ammunition of which is interchangeable with the Springfield and with all the machine guns that will be sent to France. Ample reserves and spare parts are included in these calculations.

Supplied by French Government.

(b) The American troops in France have been fully supplied by the French Government with machine guns of the heavy Hotchkiss type and the light Chauchat type. The National Army men in cantonments have been furnished a considerable number of machine guns for training purposes, and this equipment is being rapidly increased. A large number of Vickers and Lewis machine guns have been purchased, and will be used for both training purposes and for fighting in France. The great factor in machine-gun equipment, however, will be the new Browning gun, of both heavy and light types, an American invention, declared by the leading ordnance experts to be the best gun in existence, for the manufacture of which half a score of large private establishments have been fitted. Quantity production on an unprecedented scale will begin early in April, and will proceed at a rate that will keep pace with the transporting of troops to the theater of war.

Co-operation of Allies

(c) The American troops in France have been provided, through the co-operation of the British and French governments, with a full equipment of 75-mm. and 155-mm. field guns, corresponding roughly to the 3-in. field piece and the 6-in. howitzer of U. S. models. The surplus capacity of the British and French factories will supply all these guns needed until next spring. In the meantime, the Ordnance Bureau, as heretofore announced in *THE IRON AGE*, has enormously increased the capacity of the Watervliet and Watertown gun factories, and in addition has financed the equipment of more than a dozen large private establishments for forging, treating, machining and assembling some 16,

000 guns, ranging in size from the 3-in. field piece to the 9.5-in. howitzer. Large deliveries of these guns are promised for the early spring, and production thereafter will be on a very large scale.

While carefully seeking to avoid criticizing even the incomprehensible course of Congress in postponing the making of adequate appropriations until months after the United States became involved in the war, General Crozier, when pressed as to why deliveries of material were not forthcoming at earlier dates did not hesitate to declare that the results desired could only have been obtained had Congress provided the money at least two years before. He also frankly placed upon the Secretary of War responsibility for such delay as occurred in selecting a type of machine gun, a responsibility which Secretary Baker has since cheerfully assumed. The Secretary's unqualified indorsement of General Crozier's course is indicated by the fact that immediately after the Chief of Ordnance made the statements referred to his renomination for another four years' tour of duty at his present post was sent to the White House and promptly transmitted by the President to the Senate for confirmation.

Mistakes Are Admitted

That some mistakes have been made, and that delays could have been avoided had more businesslike methods prevailed in all branches of the War Department, General Crozier freely admitted. There has been some extravagance through the operation of cost-plus-profit contracts, but this has been minimized so far as possible, and adequate steps taken to protect the Government. Time has also been lost because the War Department has had no authority to use war appropriations for the housing of labor in the vicinity of private munition factories. Inadequate laws have permitted the enticing of workmen away from Government arsenals and private munition plants, and much precious time has been lost in building up organizations in the arsenals, previously running at part capacity or closed down for lack of appropriations. All these drawbacks, however, are now in a fair way to be overcome, and highly satisfactory progress is now being made in the production of all forms of war material.

It is understood that General Crozier's testimony will be followed by a statement, possibly in executive session, by Secretary Baker. The Senate committee is safeguarding the interests of the Government by keeping secret certain important facts that would be of value to the enemy through the disclosure of the War Department's detailed plans, but the feeling is strong that the public should have as much knowledge of the war preparations as possible, and everything that can be given out with propriety will be freely published. It is probable that the information obtained from the officials of the War Department will be supplemented by an inquiry conducted by the Senate committee into the activities of the Council of National Defense and the Advisory Commission.

Object of the Investigation

At the opening of the investigation, Senator Chamberlain, chairman of the committee, announced that its object was to ascertain from the War Department the progress that had been made in the matter of providing for ordnance, small arms, munitions, etc., for the present war and to determine the further needs of the Government with respect thereto. At the instance of the Secretary of War, the chairman said, General William Crozier, chief of the Ordnance Bureau, had first been summoned and would make a general statement concerning what has been accomplished in the way of war preparation and with special reference to the manufacture of small arms.

In beginning his testimony, Gen. Crozier reminded the committee of the situation at the time the United

States became involved in the war. Under the terms of the act of June 3, 1916, known as the National Defense Act, Congress had taken the position that nothing should be done with reference to the immediate participation of the United States in the war. In that act, there was adopted a program for the raising and equipment of a force of 1,000,000 men in a period of five years with a corresponding project covering armament and reserve supply, all of which would be ready when the troops were ready, which meant that both men and equipment should be procured in annual increments.

"Now, it is apparent," continued Gen. Crozier, "that a program contemplating getting ready in five years was not contemplating the present war, because nobody would have assumed that we would have until 1920 to get ready to do anything with reference to the European war. That was the situation that confronted us when war was declared by our Government in April some ten months after the passage of the National Defense Act."

General Crozier then reviewed briefly the protracted hearings before the House and Senate Military Committees upon the estimates prepared by the War Department immediately after the declaration of war and which resulted in such delay that it was not until June 15, 1917, that the first emergency appropriation for carrying on the war was actually passed. He continued:

Appropriation Insufficient.

"When we got to work and gave more thought to it, it immediately became apparent that the program of that appropriation contemplating the supplying of a million men only was insufficient. We all knew that before the supplies could be procured much greater quantities than those for a million men would be needed and we set to work at once to place orders justified by the funds that had already been appropriated and to make new estimates so as to place more orders and start the manufacturing for the additional number of troops that we knew would be needed. This particularly related to artillery, which requires a long time for its manufacture.

"The program for artillery for a million men, considering the length of time it takes to manufacture artillery, was no program at all to start the war with; we had to have a very much larger one because we knew that we could not complete it before 1919, and that then we would have more than a million men. So another set of estimates was made up and submitted in detail for an appropriation to be made for the additional supplies that we knew would be needed. That estimate, particularly as it related to artillery, was ready in my department in the early part of June and before the act of June 15 passed. It then had to be considered by the other agencies of the War Department, by the War College, and by the Department itself.

"There was no obstruction anywhere, no failure to agree, no lack of harmony, and no antagonistic discussions. There was good will throughout, but there was a necessity for showing first one agency and then another and another, and the necessity for getting the estimates of all the bureaus of the department together, with the result that our final set of estimates did not get before Congress until about Aug. 1. Then began again the process of explaining the estimates, and those of us who were concerned in getting them up and who were the only ones having the necessary knowledge of them were successively called before the committee and made our statements. Everything was well received. There was no disposition to be captious or not liberal. There was acquiescence in the very large sums that we asked, but the process took such a length of time that that second appropriation bill did not become a law until Oct. 6, just about two months ago.

Did Everything Possible

"Now, as we believed that Congress would appropriate the money, for there was no sign of any indisposition to do so, we proceeded as early as we could to do everything possible to get the manufacturing

establishments of the country going on war material in anticipation of the appropriation of the funds, and we met with a great deal of good will and a great willingness on the part of the manufacturers of the country to take what little risk was involved. But we met something else which was more of an obstacle. The manufacturers did not care to actually expend money out of pocket and in many cases they found difficulty in securing loans and otherwise in financing the spending of money in advance of the actual passage of the appropriation bill, which meant in advance of the possibility of making contracts or of receiving any money.

"Now, the President, when in his judgment it is necessary, can take a certain risk. It is not lawful, but he has many times done it in placing an order for the execution of which there are no funds appropriated, but he cannot insure the payment of a single penny out of the Treasury on such an order. Now, as to all the many cases in which the contractors would need money to go on with their work, we were helpless and they were helpless, for the money could not be paid in advance of the appropriation and mere confidence that the appropriation would be made did not meet the situation. That, of course, was the cause of very considerable and very serious delays.

"There were also delays owing to the fact that we had to make our purchases in accordance with a different system from that which we normally employed. In normal times we make known our wants and we dip into the resources of the country as an inexhaustible reservoir to supply them. The different departments of the Government do not have to take any particular care to keep out of one another's way, because there is enough capacity to supply our wants, and we are protected as Government officers handling public funds by the acceptance of the lowest bid in a competitive situation. But with the expenditures that have had to be made for this war, that situation was changed. In the first place, there was no time for competition other than of the most informal kind. There was no time for competitive bidding and the public opening of bids.

The General Munitions Board

"Now, partly for the purpose of protecting the Government officers in handling public funds under these circumstances and partly to secure a broader judgment, a board was appointed called the General Munitions Board, one of the functions of which was to pass judgment as to whether the prices that were proposed to be paid for materials purchased in accordance with the existing method were reasonable and proper. The necessity, therefore, for first negotiating purchases and then for submitting them to the judgment of another body, which naturally wanted to be informed, occasioned additional delay in the placing of orders. The instructions were that if supplies had to be had immediately, such as rations, etc., the Chief of Staff of the Army could go ahead and get them, but all of the large and important orders for material were submitted to the General Munitions Board to secure their business judgment as to whether the terms were reasonable. I do not remember any case where an adverse determination by that board resulted in the order not being placed, but there were cases in which a difference of opinion resulted in a good deal more discussion and negotiation."

At this juncture, General Crozier called attention to the fact that the committee was sitting in open session with numerous press representatives present and added that later on when he came to discuss figures showing the supply and prospective supply of war material, he would prefer to proceed in executive session.

"I think," he said, "the Kaiser would pay a good deal for such knowledge. It is the kind of information we would like to have in regard to the enemy and presumably the enemy would like to have it in regard to ourselves."

General Crozier then told the committee of another condition that confronted the Department at the outbreak of the war, namely, the slender personnel for carrying on the business of procuring equipment and supplies. At the outbreak of the war he had in his office 10 assistants; to-day, in his office in Washington,

there are more than 600 ordnance officers. A few of these additional men were brought to Washington from other stations in the service, but 95 per cent of the increase has come from civil life.

Splendid Body of Men

"They are a splendid body of men," General Crozier continued. "Of course they had to learn the business, for we had selected business and professional men, mechanical engineers, chemical engineers, and lawyers, for even lawyers were required in the drafting of contracts and to handle the legal phases of our great business. It would have been impossible to find these men in the service, and besides we could get practically nobody from the army. The line of the army itself had a tremendous problem of taking new forces and training them and getting them in shape and it was like getting blood out of a stone to get an army officer detailed from the line into the staff.

"I had to create in my office a great supply division for taking custody of this enormous amount of materials, as they began pouring in, and to take such account of it that it could be most advantageously placed in the hands of the troops. That division alone now comprises 140 officers and more than 600 clerks. In charge of that division I have placed a regular ordnance officer, and gave him as one of his principal assistants a man who had been the manager of a great mail-order house accustomed to dealing with miscellaneous articles and getting them manufactured, stored and distributed on mail orders. He gave up a salary of \$15,000 a year to come to us for the pay of a major, which, including allowances, means about \$3,500. We have a number of instances of that kind.

"My total force of officers, both in Washington and at the arsenals, and on private inspection duty on other kinds of work at the outbreak of the war, was 85. That force is now over 2100 and these people are working day and night and find it impossible to keep up with the work. Everybody goes to bed every night, and many of them late at night, leaving a great deal that he would like to do that night if he could stay there. Many of them have not had a Sunday to themselves since the outbreak of the war. This is not a complaint, for there is no complaint in these divisions. These men are doing their work cheerfully and I only mention this to indicate what we have to do and the tremendous expansion that has been necessary in order to do it."

Contracts for Material

General Crozier then took up the subject of the contracts made for material and discussed the reasons for the policy adopted by the department. He said:

As another illustration of the kind of work that had to be provided for in the absence of ability to fix prices for things in a changing market, with labor and materials leaping in every direction so that nobody could predict what they would be, your attention should be drawn to the fact that it was almost impossible for manufacturers to state what they would make things for. This resulted in very many instances in contracts of the cost-plus type where the Government pays the actual cost plus a profit which was sometimes fixed as a percentage and in other cases as a specified sum to be paid per unit. In certain instances there was a provision for increased or decreased compensation dependent upon whether the actual cost would fall below or go above the estimated figure with part of the advantage of economies going to the contractor and part to the Government, but with the penalty for greater cost falling upon the contractors.

Cost-Plus Plan

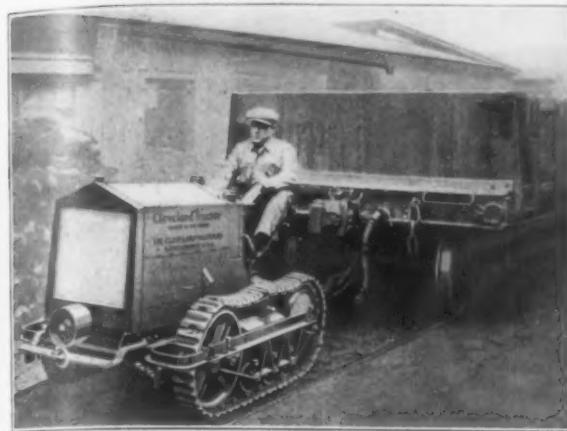
Replying to a question as to the experience of the department with the cost-plus contract, General Crozier said:

It has worked fairly well in a number of cases. It is not as good as the fixed price method where there are sufficient means of forming a judgment as to what a reasonable price should be. I feel that it should not be used except in cases of emergency, as in this instance, where we have absolutely been driven to it because nobody could fix a price

(Continued on page 1510.)

Eliminating the Switch Engine

An interesting application of the small caterpillar type industrial tractor built by the Cleveland Tractor Co., Cleveland, and illustrated in THE IRON AGE, July



Spotting a Carload of Pig Iron Having a Total Weight of 45,000 lb. with a Small Caterpillar Type Industrial Tractor

26, 1917, was recently made. One of these tractors, which is in use at the plant of the Enterprise Company, Columbiana, Ohio, has replaced the switch engine or a gang of workmen with pinch bars for spotting or switching cars. As the engine is railroad property it is available for only a comparatively short time each day, while the tractor, which is always on the premises, can be utilized at all times. Some idea of the power developed is apparent from the statement that the car which is being spotted contains pig iron and weighs 45,000 lb. together with its load.

The tractor, which is of the conventional caterpillar type so extensively employed for agricultural purposes, was originally designed as a substitute for narrow gage industrial railroads operated in connection with large plants. It does not travel on wheels, but lays its own track and consequently can pass over obstacles and move material from one department to another without marring the surface over which it travels. The over-all width of the tractor is 50 in. and it is but 2 in. more in height, so that it can pass through ordinary sized factory doors easily. In addition to transporting material between the different buildings of a plant, the tractor may also be used for bringing material from the factory to the shipping room or to cars that are to be loaded. Another application is the unloading of incoming shipments.

A New Type of Chain-Driven Concrete Mixer

A chain-driven concrete mixer has been placed on the market by the T. L. Smith Co., 1125 Thirty-second Street, Milwaukee. The chain runs underneath the drum instead of passing entirely around it as was formerly the case. The length of chain is thus materially decreased and the weight of the drum resting upon the chain keeps it taut at all times. The number of teeth in contact with chain is small, and the likelihood of the chain riding off the teeth, it is pointed out, is eliminated. The mixer is furnished with the builder's power loading arrangement or a low charging platform. The discharge chute is of the self-locking type which tends to eliminate any tendency of the chute to flip, due to the weight of the concrete falling on that portion of the chute which extends inside the drum. This is accomplished by a system of toggles which automatically lock as soon as the chute is inserted.

Manganese ore exports from India for the fiscal year ended March 31, 1917, were 631,083 gross tons as compared with 472,563 tons in the same period in 1916. Great Britain is credited with having received 459,150 tons; United States, 63,912 tons; France, 61,940 tons; Italy, 28,400 tons, and Japan, 17,480 tons.

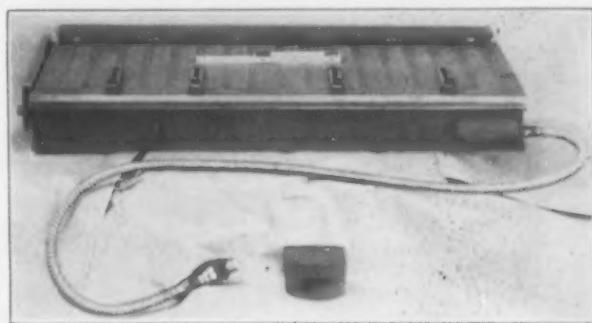
Magnetic Chuck with Rectangular Top

A magnetic chuck equipped with a removable rectangular faceplate has been brought out by the Heald Machine Co., Worcester, Mass. In addition to this feature it is also possible to shift the chuck between 110 and 220 volts direct-current circuits at the will of the user. Large holding power and low power consumption are two advantages claimed for the chuck.

The top plate of the chuck is attached to the body by closely spaced cap screws which are relied upon to draw the plate tightly down to the chuck body. These screws enter the plate from beneath, thus eliminating screw holes in the working surface through which it might be possible for water or grit to work into the interior. The front edge of the plate has a T-slot for the reception of straps, fingers, etc., according to the class of work to be handled, and adjustable side and end stops are also provided. The removability of the top plate makes it possible to replace an old plate that has become worn with a new one and use the old body and a complete set of coils, thus considerably reducing the chuck expense. In this connection, it is emphasized, however, that the top plates are comparatively thick, so that a long life can be secured from one before it has to be removed. The working surface of the chuck measures 15 1/2 x 40 1/2 in. and the holding power is about 200 lb. per sq. in.

In the body of the chuck there are two cores and two coils to each pole piece in the working surface and the coils are made up of large gage wire with enamel insulation, it being pointed out that this provides a longer life than would be possible with silk-covered wire. With a view to reducing the possibility of short-circuits as much as possible a large space is provided in the interior of the chuck between the coils. This arrangement also eliminates any necessity for ventilation so that the chuck can be used either wet or dry without change. The coils are wound on the unit system which, in addition to giving great holding power with small power consumption, approximately 300 watts, is also relied upon to give a practically uniform pull over the entire magnetic surface.

At the right end of the chuck a volt box which enables the user to change the voltage of the supply circuit from 110 to 220 or vice versa without returning the chuck to the factory forms an integral part of the body. Access to the box is provided by removing the pipe bushing, which is screwed in place after the change



A Recently Developed Magnetic Chuck with a Rectangular Top Has a Receptacle That Enables It to Be Used on Either 110 or 220 Volt Circuits

in the voltage has been made, this arrangement being relied upon to give a waterproof connection. The lead wires are protected by a heavy armored conduit and the end of the cable terminates in a standard attaching plug. A special form of demagnetizing switch is provided.

J. C. James, Lancaster, Ohio, is interested in a firm that has purchased the former plant of the Kyrl Mfg Co., that will be fitted up for making auto trucks.

The Bowlus Mfg. Co., Springfield, Ohio, will add to its present lines a building and hardware specialty for which some special equipment will be required.

Opens the Way for Foreign Commerce

Webb-Pomerene Bill to Permit Combination of Manufacturers to Engage in Export Business Passes Senate—Will Probably Reach President This Month

WASHINGTON, Dec. 18.—The Webb-Pomerene bill, exempting from the operation of the anti-trust laws combinations of American manufacturers and merchants made for the exclusive purpose of extending their foreign trade, was passed by the Senate Dec. 12, and, having passed the House last June, was immediately referred to a conference committee to consider the Senate amendments and harmonize the diverse provisions of the House and Senate drafts. While the modifications in the House bill insisted upon by the Senate were not of great importance, their adoption has had the effect of postponing the final enactment of this important measure, although it is believed it will reach the President for his signature before the end of the current calendar year.

As the result of securing the advantageous position of the "unfinished business" of the Senate at the special session held last summer, the Webb bill was promptly taken up when Congress reconvened Dec. 3, and was kept continuously before the Senate until its passage. The measure was vigorously opposed by the same small but industrious coterie of Senators, led by Cummins of Iowa and Reed of Missouri, who succeeded in preventing its passage at the special session notwithstanding the fact that it had run the gantlet of the House and had been unqualifiedly approved by the President. While Senator Reed's opposition to the bill took the form of a direct attack on the ground that it would emasculate the Sherman and Clayton anti-trust laws, Senator Cummins adopted more insidious but not less effective tactics, urging in the form of a so-called amendment a complete and comprehensive substitute hedging the measure about with such restrictions and qualifications as would have rendered it valueless for the purpose for which it was designed. The object of Senator Cummins' substitute was fully recognized by his colleagues, however, and after several days' debate, his so-called amendment was decisively defeated by the vote of 43 to 18.

Trust Fighter Favors Bill

The Cummins substitute having been disposed of, the bill as amended by the Senate Committee on Interstate Commerce was then strongly urged by Senators Pomerene, Myers of Montana, Weeks of Massachusetts, Saulsbury of Delaware, Townsend of Michigan, Pindexter of Washington and Kellogg of Minnesota. The appearance of Senator Kellogg as a champion of the measure was of special significance in view of the fact that he has on more than one occasion been employed as a special assistant to the Attorney General in the prosecution of cases brought by the Government against various corporations under the Sherman anti-trust law. Mr. Kellogg made a convincing argument as to the necessity for the passage of the bill, emphasizing the fact that even if, as has been contended, the Sherman law does not specifically prohibit combinations in the foreign trade, the difference of legal opinion and the uncertainty of the situation are such as to make it highly important that Congress should clear up all doubts by the enactment of an affirmative measure that will guarantee the desired privilege and enable exporters to secure the necessary financial support to develop their projects on a large scale.

Export Trade Defined

The Webb bill as passed by the Senate defines the term "export trade" in the first section, but modifies this provision as adopted by the House as follows, the language inserted being shown in italics while that stricken out appears in brackets:

That the words "export trade," wherever used in this

act, mean solely trade or commerce in goods, wares, or merchandise exported, or in the course of being exported, from the United States or any Territory thereof to any foreign nation; but the words "export trade" shall not be deemed to include the production, manufacture or selling for consumption or for resale, within the United States or any Territory thereof, of such goods, wares, or merchandise, or any act in the course of such production [or] manufacture, or selling for consumption or resale.

The essential provision of the bill exempting export combinations from the operation of the Sherman act is contained in the second section which, as amended by the Senate, reads as follows:

Sec. 2. That nothing contained in the act entitled "An act to protect trade and commerce against unlawful restraints and monopolies," approved July 2, 1890, shall be construed as declaring to be illegal an association entered into for the sole purpose of engaging in export trade and actually engaged solely in such export trade, or an agreement made or act done in the course of export trade by such association, provided such association, agreement, or act is not in restraint of trade within the United States, and is not in restraint of the export trade of any domestic competitor of such association; and provided further, That such association does not, either in the United States or elsewhere, enter into any agreement, understanding, or conspiracy, or do any act which artificially or [intentionally and unduly] the natural effect of which enhances or depresses prices within the United States of commodities of the class exported by such association.

Under the terms of the third section, it is provided that nothing in the Clayton anti-trust act "shall be construed to forbid the acquisition or ownership by any corporation of the whole or any part of the stock or other capital of any corporation organized solely for the purpose of engaging in export trade, and actually engaged solely in such export trade, unless the effect of such acquisition or ownership may be to restrain or substantially lessen competition within the United States."

Important Provisions

The prohibition against "unfair methods of competition" contained in the act creating the Federal Trade Commission is extended by the terms of section 4 of the Webb bill to "unfair methods of competition used in export trade against competitors engaged in export trade, even though the acts constituting such unfair methods are done without the territorial jurisdiction of the United States."

Carefully formulated restrictions are imposed upon the operations of export combinations by the terms of section 5 of the bill, which prescribes the conditions under which associations may be formed and clothes the commission with power to take drastic action to prevent abuses. This section is as follows:

That every association now engaged solely in export trade, within 60 days after the passage of this act, and every association entered into hereafter which engages solely in export trade, within 30 days after its creation, shall file with the Federal Trade Commission a verified written statement setting forth the location of its offices or places of business, and the names and addresses of all its officers and of all its stockholders or members, and if a corporation, a copy of its certificate or articles of incorporation and by-laws, and if unincorporated a copy of its articles or contract of association, and on the first day of January of each year thereafter it shall make a like statement of the location of its offices or places of business and the names and addresses of all its officers and of all its stockholders or members and of all amendments to and changes in its articles or certificate of incorporation or in its articles or contract of association. It shall also furnish to the commission such information as the commission may require as to its organization, business, conduct, practices, man-

agreement, and relation to other associations, corporations, partnerships, and individuals. Any association which shall fail so to do shall not have the benefit of the provisions of section 2 and section 3 of this act, and it shall also forfeit to the United States the sum of \$100 for each and every day of the continuance of such failure, which forfeiture shall be payable into the Treasury of the United States, and shall be recoverable in a civil suit in the name of the United States, brought in the district where the association has its principal office, or in any district in which it shall do business. It shall be the duty of the various district attorneys, under the direction of the Attorney General of the United States, to prosecute for the recovery of the forfeiture. The costs and expenses of such prosecution shall be paid out of the appropriation for the expenses of the courts of the United States.

Whenever the Federal Trade Commission shall have reason to believe that an association or any agreement made or act done by such association is in restraint of trade within the United States, or in restraint of the export trade of any domestic competitor of such association, or that an association either in the United States or elsewhere has entered into any agreement, understanding, or conspiracy, or done any act which artificially or intentionally and unduly [affects] enhances or depresses prices in the United States of commodities of the class exported by such association, it shall summon such association, its officers and agents, to appear before it, and thereafter conduct an investigation into the alleged violations of law. Upon investigation, if it shall conclude that the law has been violated, it may make to such association recommendations for the readjustment of its business, in order that it may thereafter maintain its organization and management and conduct its business in accordance with law] organization, business, conduct, practices, or management, in order that they may comply with the law. If such association fails to comply with the recommendations of the Federal Trade Commission, said commission shall refer its findings and recommendations to the Attorney General of the United States for such action thereon as he may deem proper.

In addition to the authority specifically conferred upon the commission by the section above quoted, it is further provided that it shall have all the powers granted to it by the statute under which it was created.

It is understood that as soon as the Webb bill becomes a law, the commission will organize a new Division of Export Trade, the function of which will be to supervise the operations of all associations seeking to take advantage of the Webb law.

W. L. C.

Women Replace Men in Inspection Department

The scarcity of labor because of the war caused the Burroughs Adding Machine Co., Detroit, recently to place women in its inspection department. The company now has about 120 women employees engaged in the work of inspecting small parts of adding machines, which was formerly done entirely by men. The women are employed at day rates and are engaged in such inspection work as is done with test jigs, plug and thread gages and straight edges. Experience has shown that the women learn the work quickly, do it accurately, and keep at it steadily, excelling the men employees in the latter particular. On some of the larger work they have not proved as efficient as the men, doing the work somewhat slower, but it is stated that on the average they are proving superior in speed to the former male employees in doing this class of inspection work.

No previous experience in inspection work is required of a woman seeking employment in this department, and there are no restrictions as to age. While most of the employees are girls, quite a few are women beyond the middle age. The work permits the women to remain seated all the time and probably requires less muscular effort than the operation of a typewriter. The company has also substituted girls for young men as factory and time clerks in most of its departments, and finds that they are filling these positions satisfactorily.

The Richter Brass Co., Cincinnati, maker of plumbing specialties, has been incorporated with \$35,000 capital stock by John H. Richter and others. The company's plant at Ninth and Main Streets will probably be enlarged at an early date.

Squirrel Cage Motor Starting Switch

Protection for the motor and safety for the operator are the two features claimed by the Cutler-Hammer Mfg. Co., Milwaukee, Wis., for a new starting switch for squirrel cage motors. The sliding panel which incloses the contacts and the fuses interlocks with the switch mechanism so that the fuses are always dead and the switch cannot be closed when the panel is lowered. When the fuses and contacts are covered there is, of course, no interference with the operation of the starting lever, this arrangement being relied upon to safeguard the operator at all times since he cannot come in contact with a current carrying part while operating the switch or when the fuses are being inspected or renewed. The motor, it is pointed out, is protected against overload and unexpected restarting after the circuit has been interrupted or the voltage failed as either of these causes the switch to open, and before the motor can be started, the operating handle must be moved to the proper position.

Three moving contact fingers comprise the interior parts of the switch. When the starting lever is moved to the extreme upward or starting position, these fingers bear against three stationary contacts and connect the motor directly to the supply line. After the motor has reached its normal speed, the hand is removed from the starting lever and the fingers slide into engagement with the running contacts, the change being made without opening the motor circuit. The fuses are not in the circuit when the motor is started but when the starting handle reaches the running position after the motor has come up to speed, they are automatically cut into the motor circuit. In this way the capacity of the fuses need only be sufficient to protect the motor windings.

The standard switch is made for use with a 3-hp., 100-volt motor or a 5-hp. motor wound for 220 volts.

Instruction School Established for Trainers of Shipyard Workers

To hasten the shipbuilding program a training center for instructors, who will serve as trainers of men in shipbuilding occupations, has been established at the Newport News Shipbuilding & Dry Dock Co. under the direction of the Emergency Fleet Corporation. Its object is to have the work of these instructors bear the same relation to the promotion of shipbuilding as the training of teachers in normal schools bears to the promotion of general education.

Four lines of instruction are given. These include what teachers commonly know as determination of content, organization of content, methods of instruction and class management. Put in every day language it covers what the men are going to teach, where and how. It is intended that those who are to be taught will not be withdrawn from productive work, but will have brought to them by these trained mechanics the special instruction needed to make them experts in their particular work.

The Industrial Training Section of the Emergency Fleet Corporation is in charge of E. E. McNary. Charles R. Allen is local manager, and associated with them on these organizing staffs are James E. Neary, for five years in charge of apprenticeship training at the Fore River shipbuilding plant, and H. C. Waugh, formerly industrial instructor at Seattle.



The Sliding Panel Inclosing the Contacts and Fuses of a New Safety Starting Switch for Squirrel Cage Motors Is Interlocked with the Operating Handle to Guard Against Accidental Shock to the Operator and Overloading or Sudden Starting of the Motor

Automatic Control of High Temperatures*

Some of the Instruments Recently Developed for Use in Steel Plants and Other Industrial Establishments

BY R. P. BROWN†

FOR even greater precision in temperature measurements than is secured with the high-resistance millivoltmeter, I have developed a new instrument which we call the Brown heat meter. This instrument is suitable for either measurement or automatic control of temperature. With our standard millivoltmeter of high resistance, we supply an ordinary dry cell and furnish rheostats to reduce the voltage of the dry cell from approximately 1½ volts to a range from 0 to 60 millivolts, the voltage produced as a maximum by the thermocouples. A rheostat is supplied in the meter of 15 ohms, which permits of adjusting the indications for a total change of line resistance equivalent to 15 ohms, or a circuit of two copper wires almost a mile long.

Briefly, its operation is as follows: In the first operation we oppose the voltage developed by the thermocouple to the reduced voltage of the dry cell, and when the pointer stands on zero, it indicates that the voltage from each source is equal. In the second operation we cut out with a switch the voltage of the thermocouple and read the voltage of the dry cell circuit by direct deflection. This eliminates the line resistance entirely as in a potentiometer. We have now a deflection, indicating the actual temperature developed by the thermocouple at the moment of reading the instrument, but fluctuations in the temperature of the thermocouple will not be indicated, as we are reading the voltage from the dry cell. In the next operation we connect the thermocouple to the meter instead of the dry cell circuit and we note whether the indications are the same. By switching back and forth quickly, the voltage of the thermocouple circuit or of the dry cell circuit can be noted. If excessive line resistance has caused the indications of the millivoltmeter to be lowered as compared with the dry cell circuit, a rheostat is operated to bring up the indications of the thermocouple circuit to that shown when we are reading the voltage of the dry cell circuit.

We now leave the instrument indicating on the thermocouple circuit and the errors, if any, which might be due to line resistance or changes in temperature of the line have been eliminated. Thus we have a direct-

meter equivalent to the copper or aluminum of the coil. Hence in balancing the voltage from the dry cell against that of the thermocouple we also automatically eliminate errors due to the temperature coefficient of the meter itself.

There is now left only one possible source of error, the change in the actual indications of the meter due to sticking of the pointer, abuse of the instrument, spring fatigue, etc. To obviate this source of error the instrument can be supplied with a standard cell and suitable resistors, and in the same manner as a meter can be tested by the potentiometer method we can check this meter. Where a meter is calibrated for 60 millivolts, resistors equivalent to a deflection of 20, 40 or 60 millivolts on the scale are furnished, and after balancing the standard cell against a part of the voltage of the dry cell, through these resistors we can note whether the pointer swings to 20, 40 and 60 millivolts respectively on the scale. If it does not, the error can be noted and the actual error in calibration is detected.

This instrument is a direct reading one which can be adjusted once every day or oftener if desired, for the actual line resistance with which it is used, and in the surrounding atmospheric conditions. The meter will then indicate correctly throughout the whole scale range, and the furnace man has the instrument to guide him without hand manipulation, and an inspector can daily check the calibration of the instrument.

Automatic Temperature Control

Attempts have been made in the past to operate switches and valves electrically by permitting the pointer of the pyrometer to come in contact with adjustable contact arms on each side of it. Unfortunately the millivoltmeter, used with the thermo-electric pyrometer, has an exceedingly weak control for the pointer. One is easily able to blow the pointer across the scale with the breath. Consequently, simply permitting the pointer of such a pyrometer to move into contact is not sufficiently positive to be satisfactory for automatic control work.

The automatic control pyrometer which we have developed has a thermocouple formed of a nickel chromium alloy installed in the electric furnace, the temperature of which is being controlled. Below the pointer of the high-resistance millivoltmeter, which is actuated by this thermocouple, and adjustable throughout the whole scale range, is a table carrying two contact pieces, separated by a thin piece of insulating material 1/32-in. thick. The depressor arm driven by a small electric motor, or by a clock if preferred, depresses the pointer at regular intervals, usually every 10 sec., and in doing so the pointer forces together the two contact pieces below.

Assuming the pyrometer controller is required to control the furnace at a temperature of exactly 1400 deg. Fahr., the knob on the left of the instrument is turned until the index in front of the scale stands at 1400 deg. This index corresponds to the position of the thin insulating material which separates the high and low contacts. The switch connecting the furnace in the line is closed and the pointer slowly swings across the scale as the temperature of the furnace rises. As the switch is already closed, when the pointer is depressed on the low contact, the switch continues to remain closed, and no change occurs until the pointer passes over the neutral insulating piece and is depressed on the high contact. The switch indirectly operated by a solenoid and relay is now instantly actuated and the circuit opened. The temperature of the



The Heat Meter Which Employs the Potentiometer method for the Control or Measurement of Temperatures is a Direct Reading Instrument Capable of Adjustment as Often as May Be Desired

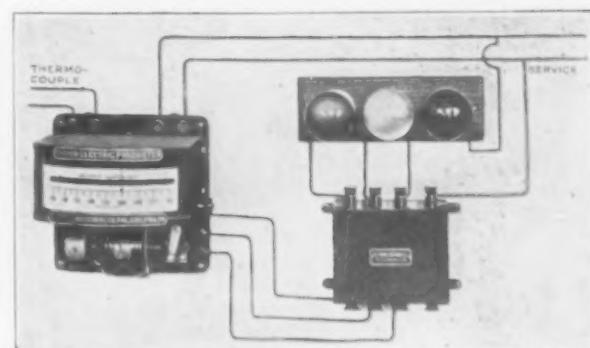
reading millivoltmeter, indicating the correct temperatures. The temperature coefficient of the meter has been eliminated by furnishing a copper resistor in the

*From a paper prepared for the Faraday Society, London.
†President Brown Instrument Co., Philadelphia.

furnace begins to fall slowly, and when the pointer is again depressed on the low contact the circuit is again closed. This operation continues as long as the furnace is to be operated.

When the switch opens and closes the main circuit, the current in consequence is either full on or off, and the fluctuations are continuous within narrow limits of some 10 to 20 deg. Fahr. These continuous risings and fallings of temperature can be largely reduced and closer control can be procured by the use of two rheostats in the furnace line. The solenoid operated automatic switch is then used simply to cut the second rheostat in and out of circuit. Assuming it is desirable to maintain 1400 deg. Fahr. continually in the electric furnace, irrespective of fluctuations of voltage, the two rheostats are set so that with only one in the circuit the temperature will rise to approximately 1500 deg. Fahr., and with the second rheostat in the circuit the temperature drops to 1300 deg. Fahr. When we now use the solenoid operated switch to cut in and out the second rheostat, we naturally control the temperature only between 1500 and 1300 deg. Fahr., and we do not have the rapid surges or ups and downs in temperature, and maximum control is secured.

It is realized that the same form of switch can be used to operate a valve to control a gas or oil furnace. We have found it desirable to use an automatic valve in a by-pass so as simply to control a portion of the



Signaling the Furnace Attendant by Colored Lights when the Temperature Is Too High or Too Low Is Also Possible

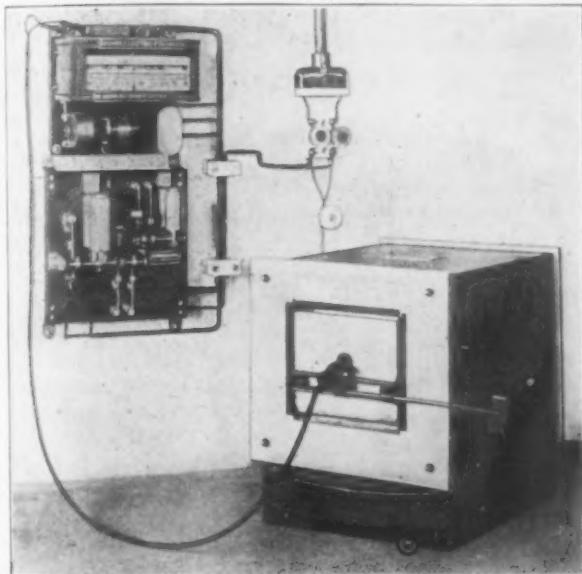
above each furnace, red, white and green. The red light burns when the temperature is too low, the white light when the temperature is within, say, 20 deg. Fahr. of the correct temperature, and the green light burns when the temperature is too high. The fireman who operates the furnace is guided entirely by the lights and a central pyrometer is used to control the temperatures.

We have been able to develop an instrument to signal automatically whether the temperature is correct or not by lights, and in this way the services of the operator at the instrument are eliminated. The same form of instrument is used for this purpose as we use to control the furnace temperatures automatically, and the pointer is depressed at intervals of every 10 sec. on the contacts corresponding to the red, white and green lights. No special battery or source of current other than an ordinary service line is required to operate these lights.

The supply may be 110 or 220 volts, and the current which lights the lamps does not flow through the instrument, but the circuit is made and broken by an auxiliary device containing the necessary mechanism. A high resistor is in series with the circuit connected with the pyrometer, which reduces the current flowing through the contactors within the instrument to less than 0.07 amp. This prevents sparking at the contactors and errors due to the heating effect of a current of higher amperage. The lamps may be any reasonable distance from the pyrometer; in fact, they are operative at a mile or more if desired.

The various thermocouples in each furnace are connected successively to the instrument through a switching mechanism, and at the same time another switching mechanism connects the various sets of lights at each furnace. We have constructed an instrument of this character to take care of the signal lights at 12 furnaces automatically. This form of equipment gives the fireman or operator of the furnace an indication by lights which he can easily understand, and he adjusts the valves or fires the furnaces accordingly. It is a simple method to instruct a man to keep the white lights burning and to explain what the red and green lights mean, and a less experienced workman can control the furnaces in this manner than where one is required who can read temperatures on a pyrometer scale. This newly developed instrument also eliminates the man to read the temperatures at the central pyrometer.

I do not doubt but that the next few years will see further improvements in pyrometers and temperature control. There will always be room for improvement, and the co-operation of the industrial works and the pyrometer manufacturers will largely hasten the development of practical instruments for the measurement and control of high temperatures.



Automatic Control of the Temperature of an Electric Furnace Is Secured by a Special Type of Pyrometer

gas or oil supply, and in the same manner as in the electric furnace control eliminate the maximum fluctuations caused by the complete opening and closing of the switch or valve. Assuming that we have a 2-in. supply pipe for the gas to the furnace it is customary for us to by-pass this and use a $\frac{1}{2}$ -in. automatic valve, which gives us approximately 25 per cent control. This is sufficient to control the usual fluctuations in gas supply and secure very satisfactory control. This method also eliminates the difficulty which would occur where the gas is completely shut off and then turned on in full, as would occur without the by-pass control.

Temperature-Signaling Pyrometer

In addition to an instrument to control furnace temperatures automatically, there has been a demand for an instrument to signal automatically by lights whether the temperature is too high, correct or too low in any particular furnace. It has been common practice in plants in the United States, where there are a number of heat-treating furnaces, to maintain an operator at a central pyrometer, and by colored electric lights at the furnace to signal whether the temperatures are right or not. It is common practice to locate three lights

The Bridgeport Brass Co., Bridgeport, Conn., has inaugurated a system of group life insurance which includes benefits for accidents and sickness. Under the Bridgeport company's plan, any employee may receive half of his wages up to a certain maximum for a period not to exceed 26 weeks for disability or sickness and a maximum life insurance policy of \$1,000.

WASTED IN BOILER ROOM

Conservation of Coal Is Discussed by the Bureau of Mines

WASHINGTON, Dec. 18.—That the production of coal for the calendar year 1917 will show a net loss in efficiency as compared with the output of 1916, notwithstanding the fact that 50,000,000 more tons will be mined, is the disquieting statement made by Director Manning of the Bureau of Mines in a statement in which he discusses the general need of fuel conservation in boiler rooms.

"There is," he says, "one phase of the present coal situation which may put an entirely different light on the supposed increased production of coal of the present year. In round numbers, there was produced 600,000,000 tons of fuel last year. Statement has been made that 50,000,000 more tons will be mined this year. The preparation of this increased quantity of coal has not been as good as in times past. Analyses of samples show in many cases a greatly increased quantity of ash. Repeated cases are brought to the attention of the Bureau of Mines, where coal which would run from 6 to 8 per cent ash in normal times is running from 12 to 18 per cent of ash in these abnormal times.

Much More Ash

"Complaint about the preparation of coal is very general and it is not at all improbable that 5 per cent more ash is included in this year's coal than in previous years. If such a figure is true, it means that 32,500,000 tons of the estimated output of 650,000,000 tons is nothing but increased ash. If we can imagine over 600,000 carloads of ash being added to the present burden of transportation, the evident effect on car supply and transportation troubles would be seen. If this were the end of the matter, it would not be so bad, but there is another factor well known to engineers which is apt to be overlooked by the non-technical user.

"The extensive experiments carried on by the Government at the St. Louis Exposition showed that with the coals used there was a decrease of about 1½ per cent in efficiency for each 1 per cent addition to the ash content of the coal—that is to say, the inclusion of more ash with the coal decreases the value of the fuel not only the amount equal to the useless ash, but it makes the remaining good coal less effective to the extent of 1½ per cent for each 1 per cent of ash. The inclusion of 5 per cent more ash in the fuel, therefore, means a reduction in efficiency of the remaining good coal of about 7½ per cent, which, added to the 5 per cent useless ash, makes a total reduction in effectiveness of 12½ per cent.

An Actual Decrease

"According to this point of view, although 650,000,000 tons may be produced in 1917, its effectiveness as compared with previous years is probably about seven-eighths of this, and equivalent to a production of normally prepared coal of about 570,000,000 tons. We have then, instead of an increased production as compared with last year, an actual decrease of effective coal of about 30,000,000 tons. If this is added to the estimated increased needs, due to our accelerated activities, of 100,000,000 tons, we have a deficiency of the equivalent of 130,000,000 tons, instead of 50,000,000 tons to make up by good engineering and true fuel conservation in the boiler room."

In its campaign in aid of fuel conservation, the Bureau of Mines calls attention to the fact that, while an organized effort to bring about efficiency in the production and distribution of coal is being made, no parallel measures have been adopted to bring about a normal and practicable efficiency in its use. The needs of large plants, which are consuming fuel wastefully, in many ways, it is said, more wastefully and carelessly than ever before, are directly and needlessly causing a large fraction of the existing car shortage.

The preventable waste of fuel in the boiler furnace of one steel mill is said to have amounted to 40,000 tons per year, which at \$5 a ton would cost \$200,000.

This was a comparatively modern plant. The efficiency of boilers and furnaces in a 14-day test was 55 per cent. The load factor was unusually favorable to high efficiency and could readily be raised to 70 per cent or over. This is only one example and there are many more extreme cases. In one hand-fired plant the evaporation was raised from 6 to 9 lb. in a few days of instruction, and continuously kept close to this higher mark with the help of coal and water measurements which were inaugurated. The saving was due exclusively to instruction and consequent better operation.

The Bureau of Mines estimates that one-half of the 600,000,000 tons of coal mined in 1916 was used for industrial boiler plants, and that one-fourth of this amount might have been saved by more efficient methods of consumption. The saving of this quantity would have a tremendous effect upon the transportation situation, as it represents the use of 1,500,000 50-ton freight cars.

HYDRAULIC FORGING PRESSES

Compilation of Literature on the Machinery Used in Plastic Metal Deformation

A bibliography of the most important books and articles describing and analyzing hydraulic forging presses and accessory machinery, such as accumulators, intensifiers and valve-gear, has been made by E. C. Buck, New York. Patent literature is for the most part intentionally excluded from this preliminary list. This compilation supplements another by the author on "Plastic Metal Deformation," published in THE IRON AGE of Nov. 1, 1917.

1795—Brahma,
Water-pressure press.
British patent 2045, April 30, 1795.

1826—Tredgold, J.
Description of an improvement of Brama's hydro-mechanical press.
Edinburgh Philos. Jour., 1826, v. 27, p. 29.
Dingler's Polytechn. Jour., 1826, v. XX, pp. 217-223

1829—Alban,
Attempt at an improvement of hydraulic presses.
Dingler's Polytechn. Jour., 1829, v. XXXII, pp. 73-82.

1856—Bessemer, Sir Henry.
Shaping, pressing and rolling malleable iron and steel.
British patent 1290, May 31, 1856.

1863—Hydraulic press for rapid forging (System Haswell).
Zeits. Vereins Deutsch. Ingenieure, 1863, v. VII, pp. 287/90, (plate VIII).

1864—Pump for hydraulic presses, with automatic disconnection.
Mittl. d. Gewerbe-Vereins für das Königl. Hannover, 1863, nos. 4 and 5, from p. 273 on.
Zeits. Vereins Deutsch. Ingen., 1864, v. VIII, p. 222.

1863—Bessemer, Sir Henry.
Construction of hydraulic presses and machinery.
British patent 1439, June 9, 1863.

1874—Tweddell, R. H.
On the application of water pressure to driving machinery and working shop tools.
Proc. Inst. Mech. Engrs., 1874, pp. 166-203, (plates 51-61).

1875—Report of the U. S. Commissioners to the International Exposition at Vienna. Edited by R. H. Thurston, Washington, 1875.
Kick, F.
The relative value of blows and pressure in their utilization for performing deformations.
Dingler's Polytechn. Jour., 1875, v. 216, pp. 377/389.
Min. Proc. Inst. Civil Engrs., 1875, v. 44, pp. 302-306.

Thurston, R. H.
Report on machinery and manufactures: with an account of European manufacturing districts. Washington, 1875.

1876—Armstrong, Sir W. G.
The history of the modern development of water-pressure machinery.
Min. Proc. Inst. Civil Engrs., 1876-77, v. 50, pp. 60-88; discussion pp. 89/102, (plates II-IV).
Butler, J. O.
On the hydraulic forging and stamping of malleable iron or the "System Haswell" of Vienna.
Jour. Iron & Steel Inst. (London), 1876, pp. 428-448.

1877—Hydraulic press for the production of Whitworth steel.
Dingler's Polytechn. Jour., 1877, v. 225, pp. 423-25, (plate VI, figs. 17-20).
Publication Industrielle (Armengane), 1877, v. XXIII, from p. 331 on.

1878—J. F. Taylor's direct-acting steam and hydraulic press for cotton, oil, etc.
Dingler's Polytechn. Jour., 1878, v. 229, pp. 122-27.
Berrier-Fontaine, M. M.
On the hydraulic machinery in the iron shipbuilding department of the naval dockyard at Toulon, France.
Proc. Inst. Mech. Engrs., 1878, pp. 346-394.

(Continued on page 1522)

WILL FAVOR TAXPAYERS

Ingenious Rulings to Be Made to Avoid Appeal to Congress

WASHINGTON, Dec. 18.—The Treasury Department has decided to eliminate the ambiguities, uncertainties and absurdities of the excess profits tax by a series of arbitrary rulings and thus avoid the necessity of seeking legislation at the hands of Congress to clarify this extraordinary statute. Reduced to plain English, the department proposes to assume the responsibility of legislation by regulation and to take the risk that the courts may overturn its construction of the law.

This important decision has been reached as the result of a report received by the Commissioner of Internal Revenue from the Board of Excess Profits Tax Advisers which suggests a series of ingenious rulings under which the bureau, by more or less stretching of the plain terms of the law and bridging over its numerous defaults, can so construe the statute as to enable the Internal Revenue Bureau to proceed with the collection of the tax. For several weeks the board has debated the practicability of this solution of the problem, but having finally decided that legislation can be dispensed with at this time, the Commissioner of Internal Revenue is now proceeding to sound the keynote of the bureau's campaign with as much assurance as if there had been at no time any doubt as to the proper construction of the law.

The frequently repeated statement that the excess profits advisers have declared this section of the law to be "crude, unworkable and impossible of administration," Commissioner Roper now proceeds to deny in an official bulletin given out by the bureau. "No such statement has been given out by the excess profits advisers and no such conclusion has been reached by them," says the commissioner. "On the contrary, the excess profits advisers report to me they feel that few features of the law will require legislative redress and that they are confident equitable administration can be effected through constructions not out of accord with the revealed intent of Congress. To this end several Treasury decisions are now in course of preparation with a view to submitting them to the Secretary of the Treasury. With these decisions in force and others which will follow soon, the bureau will be able quickly to prepare and promulgate the regulations necessary to the administration of the law."

Of course, anyone at all familiar with revenue legislation and with the departmental procedure commonly necessary to its construction and enforcement will need nothing more than Mr. Roper's statement to prove that everything that has been said about the excess profits tax law is true. Mr. Roper makes the damaging admission that a "few" features of the law "will require legislative redress," which is all that anyone has ever charged concerning it. He further concedes that the "constructions" to be made by the bureau are not the obvious ones, as should always be the case in a taxing statute, but are merely "not out of accord with the revealed intent of Congress." Mr. Roper, therefore, makes it perfectly plain that the bureau is preparing to construe the law from the standpoint of expediency, its sole care being to keep within what it believes it can defend as the "intent" of Congress. The commissioner also begs the whole question when he admits that a voluminous series of arbitrary decisions will be necessary, not for the administration of the law, but as a basis for the regulations under which the law is to be executed. Never before, it is believed, has the Treasury Department been reduced to such an extremity in the effort to avoid its plain and businesslike duty of applying to Congress for the prompt revision of a statute under which it is proposed to raise hundreds of millions of dollars from the leading industries of the country.

As an illustration of the lengths to which the bureau is prepared to go in the way of distorting the plain language of the excess profits tax to avoid legislative amendment, a decision just promulgated concerning the treatment of exemptions and deductions may

be cited. If there is one thing that is perfectly plain in the letter of the law it is that the exemption provided by the act must be deducted under the first "bracket," or rate of tax, or cannot be deducted at all. The fact that this would work a great hardship to the taxpayer in many cases is merely another way of saying that the statute should be promptly amended. The bureau, however, proposes to circumvent this difficulty by arbitrarily holding that if the exemption cannot be deducted from the first bracket, it may be applied to the second and to succeeding brackets, if necessary, until the full deduction has been taken. The ruling in question is as follows:

The method of allowing the deduction authorized by sections 203, 204, 205 or 210 of the act of Oct. 3, 1917, will be as follows:

In any case in which the deduction provided for in sections 203, 204, 205 or 210 is greater than 15 per cent of the invested capital and therefore cannot be fully allowed under the first rate or bracket of section 201, then in that event any remaining portion of the deduction will be allowed under the second bracket, and continued, if necessary, into the succeeding bracket or brackets until the entire amount of the deduction is allowed.

Illustrations.

An individual or partnership engaged in the manufacturing business with a capital of \$30,000 and a net income of \$12,000 for the taxable year, an average pre-war net income of 9 per cent, or \$2,700, and a total deduction of \$8,700:

Bracket	Rate (Per Cent)	Amount Tax- able Under	
		Each Bracket	Tax
1	20	.....	.....
2	25	.....	.....
3	35	.....	.....
4	45	\$1,200	\$ 540
5	60	2,100	1,260
Total			\$1,800

A corporation engaged in the manufacturing business with a capital of \$30,000 and a net income of \$12,000 for the taxable year, an average pre-war net income of 9 per cent, or \$2,700, and a total deduction of \$5,700:

Bracket	Rate (Per Cent)	Amount Tax- able Under	
		Each Bracket	Tax
1	20	.....	.....
2	25	\$ 300	\$ 75
3	35	1,500	525
4	45	2,400	1,080
5	60	2,100	1,260
Total			\$2,940

Attorneys for corporations liable to the excess profits tax will no doubt suggest that the Treasury Department will find itself in an awkward position should the courts on appeal by taxpayers fail to uphold these forced constructions. The answer is interesting. In the first place, it is intimated that the arbitrary rulings of the bureau are to be so favorable to the taxpayers that there will be no incentive to contest them. In the second place, the decision not to apply to Congress to amend the law relates solely to the operations of the first taxable year under the new statute. It is a foregone conclusion that additional taxing legislation will be framed by the present Congress, and in all probability at the present session, and when this is attempted an effort will be made to straighten out the excess profits tax tangle. To do so in time to have the revision apply to the taxable year 1917, however, would necessitate such haste as would give any small band of obstructionists in either house a tremendous leverage with which to force extraneous matters into the amendatory bill; hence the plan to revise the law immediately has been abandoned.

W. L. C.

The total production of bituminous coal, including coal coked, according to estimates of the United States Geological Survey, was at the rate of 1,855,537 net tons per day in the first eight days of December, as compared with 1,887,534 tons, the daily average for the week of Nov. 17. This indicates that production fell but little below the high level of November.

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Inexperience at a Premium

That this nation's sins of unpreparedness for war would be visited on its head was inevitable. Yet that blanket must not be stretched to cover every blunder and every case of incapacity in responsible places. Investigations are coming thick and fast and resignations and readjustments are the order of the day. The United States was to profit by the grievous mistakes of Great Britain; but there seems to be that about war which makes even the largest experience of others of little value, even in the face of conditions almost identical. And at Washington there was this distinct difference from any European situation—that for years the Government had been antagonizing the men and the industries whose help was indispensable to the effective conduct of the war. These men and these industries have made a magnificent response to the calls made upon them in the past nine months; but they have been hampered by the inexperience of those who have acted for the Government in dealing with them. The paramount and continuing blunder has been the selection of men for places of authority because of their well known capacity in lines entirely apart from those with which they would have to deal on behalf of the Government.

It takes a great stretch of the mind to conceive of a fuel situation as bad as to-day's resulting from the management of a man of lifelong experience in coal and transportation. It has never happened that one man knew more about a given thing in government or industry than all the men who had had most to do with that thing. But granting that dictatorships are a war necessity, why make men dictators who are utterly without experience in the complicated matters they must handle and unused to administration on the scale of the needs of a hundred million people?

The war has been full of mistakes. Germany has had her share; her autocracy and even efficiency have given no exemption. While the counsel and co-operation of our Allies will be of vast help to the United States, our part in the great conflict will inevitably be marred by shortcomings all our own. But the country has a right to expect that when weaknesses have been disclosed the remedy shall be applied and that palpable defects in organization

shall not be allowed to run on to a condition inviting disaster.

Loyal Foreign Workers

The declaration of war against Austria-Hungary was entirely logical and just, but doubtless it was delayed on account of the very large number of citizens of the dual monarchy living in this country who are not at all in sympathy with the cause of Austria-Hungary in this war and are thoroughly loyal to their adopted country. Hence it is gratifying that the President and the Attorney General have taken a strong position in favor of being lenient with citizens of Austria-Hungary in the United States. The President's proclamation declaring a state of war against Austria-Hungary does not classify the people of those countries living in the United States with German enemy aliens, nor does it require registration or impose any irksome conditions. It gives the subjects of Austria-Hungary an opportunity to show continued loyalty. They have already done this, particularly in Pittsburgh, Youngstown, Gary and other centers, where thousands of them are employed in iron and steel plants. The expressions during the past few days from their leaders indicate that the confidence imposed in them by the high officials of the Government is thoroughly appreciated. It would have been most unfortunate had any steps been taken to alienate the many subjects of Austria-Hungary who have demonstrated their strong loyalty to this country by their faithfulness in industrial work, by the organizing of recruiting committees and by their service in our armies.

Colorado Company Vindicated

In the report of the Industrial Commission of Colorado in the case of the United Mine Workers of America against the Colorado Fuel & Iron Co., which has just been published in pamphlet form, the shallowness of the claims of the union is clearly set forth. The commission finds that with the exception of the demand for recognition of the union, the grievances were nearly all of a trivial and unimportant character and could have been promptly and easily adjusted by the employees

and their employer through the channels provided by the company's industrial plan. As to the recognition of the union, the commission states that the question is one with which it has nothing to do, as the scope of its authority is limited to questions of wages, hours and working conditions. It expresses the opinion that there was no demand on the part of any considerable number of employees of the company for the presentation of the grievances and that the demand for recognition of the union was a matter of petty internal politics promoted for the purpose of advancing the interests of a faction of the United Mine Workers of America. The commission believes that there is no cause for making a demand for recognition during times like the present, when the country is at war and needs the undivided support of all its people, and that had these questions been referred for settlement "to our own citizens" no such demand would have been made. This a thoroughly sound position and in line with the understanding had at Washington months ago, that neither employer nor employee should endeavor during the war to change fundamental conditions in any way.

The report is a high tribute to the earnest effort which has been made by John D. Rockefeller, Jr., and the officers of the company to establish industrial peace and provide an adequate way for the adjustment of all difficulties. It would seem that after such positive findings by a State commission, efforts to trump up other complaints will not soon be made.

Exports of Automobiles

Early in the European war it was noticed that the exports of motor trucks had been greatly stimulated, while the exports of passenger automobiles had diminished. Of late there has been another reversal, the exports of commercial vehicles decreasing somewhat from their high point, while the exports of passenger vehicles have increased. Exports have been as follows, in fiscal years:

Number of Automobiles Exported, Fiscal Years

	Commercial	Passenger
1913	993	24,293
1914	784	28,306
1915	13,996	23,880
1916	21,265	56,234
1917	15,977	64,834

Since July 1 the exports of both commercial and passenger vehicles have been decreasing, but it is too early to determine whether this decrease will be permanent with respect to commercial vehicles, when the ability of the Entente Allies to purchase has been increased by the interest our own Government takes in the matter.

Unfortunately the Government statistics do not show the countries of destination separately for commercial and passenger vehicles; but the distribution of the total, in the past fiscal year, was largely what one might expect in peace times. There was no great preponderance of exports to the countries that are at war. The rest of the

world, South America, Africa, Asia and Oceania, bought heavily, as did Canada. The assumption is that the trucks went largely to the belligerents and the passenger vehicles to the neutrals. The buying power of the neutrals has evidently greatly increased as the war has been prolonged.

Conservation of Coal

Conserving coal by improving the efficiency of its use is the most satisfactory way of ameliorating the present fuel situation. Two general methods to this end were proposed at the annual meeting of the American Society of Mechanical Engineers. One of these provides a general educational plan for instructing boiler-room firemen and disseminating information on boiler operation. The other would utilize government agencies to coerce wasteful consumers of coal to improve their methods. Priority regulation of coal deliveries and firemen's licenses subject to cancellation on proved incompetency are the agencies suggested.

Both plans are open to adverse criticism. Education is looked upon as slow and inefficient in developing immediate improvement. Coercion is referred to as a drastic use of authority not warranted in democratic institutions. But the question is one of policy and the results obtainable must govern the choice of method. Education may be slow and necessarily inefficient as it depends for results on the initiative of those taught; but it may prove more profitable than the resort to coercion which may develop further confusion rather than ameliorate the situation.

Use of priority power to direct coal to those essential industries using it most efficiently or the issuance of firemen's licenses which subsequently may be recalled from men working in inefficient plants, both of which methods contemplate restriction of the manufacturing processes of plants wasting fuel, will depend for success on two factors. Can the efficiency of fuel utilization in plants be determined equitably to provide, within reasonable time, a classification as a basis for applying coercive measures? Can coercive measures be applied without diminishing the production of essential commodities?

There must be no restriction of essential production. Unless the efficient plants are capable of taking on the burdens of inefficient ones coercion must not be applied. If the present serious coal shortage continues it is likely that a diminution in production will result; and even though non-essential industries be curtailed, it is possible that sufficient fuel to maintain capacity production may not be obtainable. Coercion would then appear to be in order, but its effectiveness would depend on the fairness with which plants can be classified according to their efficiencies.

Thorough inspection of all boiler plants would be a task of great magnitude and would offer many obstacles. Efficiency cannot be determined by mere visual inspection of boiler-room apparatus and methods. Testing all boilers is practically impossible and, as test results are not accurate indications of average operating performance, this method of classification would be altogether undesirable. Data from plant records are

commonly not sufficiently accurate to justify their use. Accurate methods of measuring coal and the equivalent evaporation developed are not in general use. Also, measurements of feedwater do not determine the quantity of steam produced unless the quantity of water blown from the boiler or otherwise lost before conversion to steam is known. In fact, evaporation results based on feedwater measurements may be made to appear better than are actually obtained should the boiler man choose to do this rather than be criticized as inefficient. Load characteristics have an important influence and good performance on the day of inspection does not insure a continuation of such operation. Any plan of inspection must also include the utilization of steam, for a plant with an efficient boiler room may lose its economy through inefficient engines. Such inspection in itself would be a prodigious task.

Government coercion appears quite unnecessary. Shortage of coal is in itself a stimulus. As the coal pile of a plant dwindles, with little prospect of replenishment, the management awakens to the necessity of better utilizing the remaining fuel. Educational means, therefore, may be looked to with good expectation of results. They will be effective, no matter what further means may be used.

It is well to emphasize that coal, ashes and feedwater should be weighed daily so that comparative records of performance may be obtained by the boiler foreman and the plant management. Weighed carloads of ashes and coal will serve for this purpose, when moisture contents are determined, provided more accurate methods are not available. The steel industry also will find saving possible in the utilization of its blast-furnace gas. Boilers burning such gas usually may be improved 10 to 15 per cent in efficiency, equivalent to a saving of approximately 18 tons of coal a day for a 500-ton furnace.

There is no danger of a serious labor shortage in war industries on account of the draft for the army. At least such a view comes from the Provost Marshal General's office. Appeals have been favorably considered in behalf of pattern makers, die makers and highly skilled mechanicians in the machinery trade. A claim for a discharge must be filed with the district exemption board before the fifth day after the mailing by a local board of notice to the person concerned that his name has been certified for service. For this purpose form No. 161 or 161-a must be used. The question in the individual case is: Is the industry in question necessary to the maintenance of the military establishment, or the effective operation of the military forces, or the maintenance of the national interests during the emergency, and does the person for whom discharge is sought occupy such a status in the industry that his place cannot be filled by another without direct, substantial, material loss and detriment to the adequate and effective operation of the particular enterprise? An appeal from a final decision of a district board may be taken to the President.

CORRESPONDENCE

The Electric Arc of the Rennerfelt Furnace

To the Editor: In THE IRON AGE of Nov. 15, 1917, there appeared a very interesting article by Haakon Styri on "Electric Furnaces in Norway's Iron Industry." There are, however, a few statements in this article regarding the Rennerfelt furnace which my experience has shown to be false and to which I take the liberty to object. Mr. Styri says:

There is very little in the feature claimed as specific to this [the Rennerfelt] furnace, that the arrangement of electrodes serves to throw the arc against the bath. Anyone will find that an arc will play against the molten charge when, with single or polyphase current, the electrodes are placed at an angle to the charge. The arc will follow the path of least resistance; that is, where the gases are hottest between the electrode ends and the bath.

I wish to refer Mr. Styri to an article by C. H. VomBaur in THE IRON AGE of May 4, 1916, which shows an actual photograph of the arc taken *when no charge was in the furnace*. It is hard to explain why the arc should be blown down, as indicated by the photograph, if it was not caused by the magnetic field set up by the current in the vertical electrode, on account of the patented arrangement of the electrodes.

That the deflected arc, as used in the Rennerfelt furnace, has a very beneficent influence on the life of the roof and the lining is a fact well proved in practice. I have records of a basic lined furnace, operating in this country, in which as many as 160 heats of steel have been made without repairs to the silica roof and side walls. The furnace mentioned is subjected to very severe service. Three heats are taken off every day in 10 to 12 hours and the furnace is left to cool off during the night. With acid lined furnaces more than 200 heats have been made without repairs. In the Stassano furnace, which is the only other furnace of any importance using a free-burning arc, results like these would be unobtainable, the reason being that in this furnace the arc is not blown down.

Mr. Styri also states that "when starting to melt down cold scrap the arc is not more steady than it is, for instance, in a 3-ton Heroult furnace." Mr. Styri's opinion in this respect differs decidedly from that of many electrical engineers who have had opportunity to inspect Rennerfelt furnaces in operation. The Rennerfelt furnace is generally considered as running more smoothly than any other electric furnace on the market, the induction furnaces excepted.

I agree, however, with Mr. Styri that the first Rennerfelt furnaces installed in the United States left something to be desired, as far as mechanical strength and shape of the furnace body were concerned. All this, however, has been corrected and improved upon in recent designs.

AXEL PAULSSON,
Metallurgist, Hamilton & Hansell.
New York, Dec. 14, 1917.

Enlistments Stopped

WORCESTER, MASS., Dec. 18.—The action of the Government in stopping enlistments of men from New England plants essential to munitions production without the signed consent of their employers and the returning on conditional discharges of men taken in the first draft has had a reassuring effect as to the stability of the working forces, and employers are hopeful of retaining the skilled men that must be the nucleus of expanded shop crews.

The American Brake Shoe & Foundry Co. is planning to erect houses for 300 families in Erie, Pa., to provide homes for additional employees required by the large extensions to the company's plant.

New Selective Service Regulations

Some of the points of the new army draft regulations emphasized by the Employers' Association of Pittsburgh follow:

The first page of the questionnaire contains a place for the registrant, or other persons for him, to claim exemption or deferred classification, and a place for a waiver, which must be sworn to. All exemptions and discharges made prior to noon on Dec. 15 are revoked. All persons filing a claim for exemption or deferred classification must do so within seven days from date of mailing of questionnaire to the registrant. An extension of time will only be granted in a few instances on a proper showing being made to the district or local board. Claims for deferred classification on the ground of engagement in industry or agriculture, together with supporting affidavit evidence, must be filed with the questionnaire, of which it is a part, with the local board. The district board shall have exclusive original jurisdiction to hear and determine all questions on claims for deferred classification of persons engaged in industries, including agriculture, found to be necessary to the effective operation of the military forces.

All appeals from classification must be filed with the local board within five days from the mailing of the notice. Appeals to the President can only be made by a registrant in Class 1, or in a class more deferred than Class 1, and only when there has been at least one dissenting vote in the district board. In industrial or agricultural cases it must be by the written recommendation of one member of the local board, and by either the Government appeal agent, or the adjutant general of the State, and in dependency cases the same proceedings, with more affidavit evidence required.

Men found disqualified for general military service, but qualified for special and limited military service, are not placed in Class 5, but are subject to induction into the military service only when a special call is made for service for which they are qualified.

Any registrant who is so far distant from his local board as to make it a great hardship for him to respond to its orders may apply to his local board to have all of his future procedure transferred to a convenient local board, supporting the request with such evidence of necessity as he cares to submit.

Experts and men highly skilled in industry or agriculture will be inducted into the military service, when the national interests will be thus better served than by leaving them engaged in industry or agriculture, and when the services of such experts are required the adjutant general will make a call upon the governors of the different States for their quota, and divide the burden equally among the States as far as practicable.

Permits for Ocean Shipments

On shipments due on all Allied Government contracts and under the new regulations made by the Traffic Executive of the Allies, 165 Broadway, New York, and the Export Division of the General Operating Committee of the Eastern Railroads, the shipper must apply for permits for railroad movement to the seaboard to the following members of the Traffic Executive, at the addresses given, for the respective countries:

FRANCE—Capt. R. H. Michel, French Commission, 8-10 Bridge street, New York.

ITALY—A. Palanca, Italian Ministry of Shipping, 291 Broadway, New York.

RUSSIA—C. J. Medzikovsky, Commercial Attaché to the Russian Embassy, 1 State street, New York.

GREAT BRITAIN—Capt. Connop Guthrie, British Ministry of Shipping, 165 Broadway, New York.

On shipments to consumers in neutral nations, the important thing now is to secure a permit of the company operating the ship which it is expected to use and this must be done before mills or railroads can be interested.

New Jersey is the first state in the United States to undertake the organization of its manufacturing industries on a war basis, with the object of assisting the Government, and this step was taken Dec. 19 at the War Convention of the Manufacturers' Council of the New Jersey State Chamber of Commerce, held at the Robert Treat Hotel, Newark. The iron and steel industry was represented by L. S. Ayre, International Motor Co., Plainfield, N. J., and Arthur E. Barlow, Barlow Foundry Co., Newark.

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A Year's Developments in Naval Ordnance

Gun-Making Capacity Largely Increased by the Added Capacity of Private Makers—New Designs and Calibers

WASHINGTON, Dec. 18.—The great assistance which the iron and steel industry of the country has afforded the Government in the manufacture of heavy guns for the Navy is acknowledged in highly appreciative terms by Rear-Admiral Ralph Earle, chief of the Bureau of Ordnance, in his annual report to the Secretary of the Navy. This co-operation has enabled the department to meet promptly the very serious problem arising out of the requirement for more than 5000 guns for the protection of merchant vessels in addition to the armaments for naval vessels and for reserve purposes.

Unprecedented Demand for Guns

The present year, Rear-Admiral Earle says, has seen an unprecedented demand for guns of from 3 to 5-in. caliber, a demand entirely beyond the capacity of existing manufacturing establishments to produce. At the outbreak of the present war all spare guns from 6-in. 45 caliber to 3-pounder, inclusive, for which mounts were available, were grouped into reserve batteries and either tentatively or finally assigned to merchant ships. The bureau realized that there was a shortage of these guns, and at the time the war broke out was manufacturing approximately 300 guns to form into additional reserve batteries. The peculiar conditions of this war, however, have required approximately 5000 guns for this purpose. It immediately developed that the forging capacity of the country was entirely inadequate to meet the demands of the Army and Navy, to say nothing of the requirements of both. It therefore became necessary to start new plans in the manufacture of both guns and gun forgings.

The bureau succeeded in enlisting the services of several new firms in the Middle West and has endeavored to give them every assistance in the way of advice from skilled personnel. That more firms could not be interested was due to the fact that money to permit of plant extension was not obtainable. To relieve this situation the bureau, under date of June 5, 1917, drew up a letter to the Secretary of the Navy, requesting that Congress be asked to authorize the payment of advances to contractors, not to exceed 30 per cent of the total amount of their contract, such advance to be covered by suitable bonds. Such advances are now being made.

Nation's Gun-Making Capacity Increased

The Bureau of Ordnance is now assisting in developing increased capacity in output in the plants of the Inland Ordnance Co., Bedford, Ohio; the Taylor-Wharton Iron & Steel Co., Philadelphia, and the Alloy Steel Forging Co., at Pittsburgh. In addition the Midvale Steel & Ordnance Co. and the Erie Forge Co. have made large extensions to their plants.

The following new concerns have undertaken the manufacture of guns: The Root & Vandervoot Co., East Moline, Ill.; the Defiance Machine Works, Defiance, Ohio; the American Radiator Co., Bayonne, N. J.; the Inland Ordnance Co., Bedford, Ohio; and the Poole Engine & Machine Co., Baltimore, Md.

In addition, the resources of the Bridgeport Projectile Co. have been expanded and contracts placed with the Driggs Ordnance Co., the General Ordnance Co., the Savage Arms Co., and the American & British Mfg. Co., to the extent of their capacity. The Bethlehem Steel Co., having been assigned to the Ordnance Department of the Army, this bureau has obtained none of its new forging output. Owing to the length of time that is required for new concerns to prepare for and become accustomed to the processes of gun forging and gun manufacture, the earliest deliveries under these new capacities will not be obtained until January or February, 1918. Until that date there will be a large shortage of guns, but the bureau hopes to be able to

meet the large destroyer construction program and to arm all ships being built or taken over by the Shipping Board, with but slight delay.

Progress in Design of Ordnance and Small Arms

The success of the committee on Army and Navy artillery of the Council of National Defense in bringing in new and additional sources of supply for ordnance materials has proved of very valuable assistance to this bureau.

During the past year the bureau has developed a new type of high-powered 6-in. gun, which is to be installed in the scouts. A 16-in. 50-caliber gun is nearly completed at the Washington Navy Yard, and it is anticipated that it will be proved within the next three months. Further, certain designs of new and advanced types of ordnance of a confidential nature have already been carried out.

The bureau has ascertained that the life of the large-caliber guns has been underestimated, a 14-in. 45-caliber gun having been fired a number of rounds far in excess of that considered practicable. The same holds true for the 5-in. 51-caliber gun which it was believed had a very short life. Experiments to determine the material or treatment by which erosion could be lessened have been carried out, but due to the stress of routine work and the fact that the production of standard material is urgently required at present, it had to defer the extensive program of experiments that would otherwise have been desirable.

The Bureau of Ordnance was awaiting with interest the results to be obtained by the Army Machine Gun Board that was to meet in May to determine the most suitable type of machine gun, but the approach of war made it imperative to obtain additional machine guns without waiting for the results of the May tests. With the co-operation of the major-general commandant U. S. Marine Corps, tests were held at the marine rifle range, Winthrop, Md., during April and the early part of May, and urgent orders were placed for the three types of machine guns that were readily procurable. Considerable numbers of these guns have already been delivered and larger quantities will be delivered in the near future to provide for the immediate needs of the Navy and Marine corps.

Sufficient rifles have been procured from the army to provide for the needs of vessels afloat and to partially provide for training camps. The situation regarding pistols is not yet satisfactory.

Contracts were awarded this year for all projectiles for which funds were available. The bureau has projectile contracts with 23 manufacturers. Many of these firms have not previously made projectiles for the Navy. The almost unlimited capacity of the country for projectile making was indicated when 69 firms bid on one proposal and at prices lower than any previous ones. Even with the Navy's demand for shells there are many large and well-equipped shell plants not operating, due to lack of orders.

The rate of production of armor-piercing projectiles has greatly increased and the quality of these projectiles now being delivered is better than it has been in the past. For some months it was a source of much apprehension to the bureau that no firm could deliver high-quality armor-piercing 14-in. projectiles. Difficulties encountered in their manufacture were surmounted during May; deliveries are now well ahead of contract date, and sufficient projectiles of this type are now in reserve. One English firm, Hadfield's, has a contract for such shell, but has made no deliveries to date.

The manufacture of open-hearth steel by the use of cheap unsalable scrap has been further developed, effecting considerable saving over the ordinary practice

of using practically all the heavy and higher-priced melting stock. Notwithstanding the recent increases in the market value of pig iron the cost of liquid steel from the open-hearth furnace has remained practically the same on account of the use of cheap steel scrap, which up until this time had to be sold at prices which amounted to a loss of money to the Government.

Metallurgical practices brought into effect in the bronze and brass foundry during the fiscal year 1916 have been continued with steady improvements. The immense accumulation of scrap metals which existed two years ago has been very materially reduced, and in many instances it is now necessary to resort to the use of new metals on account of the scarcity of scrap metals. On account of the scarcity of red bronze and composition scrap, consistent efforts have been made to increase the use of naval brass and manganese bronze by making a study of the various castings and the substitution of these cheaper grades of materials, for which the present supply of scrap is still more than adequate to meet all of the demands of the foundry for metals, and the use of manganese bronze during the past year has increased from approximately 188,000 lb. to 363,000 lb. per year, and of naval brass from 320,000 lb. to 637,000 lb. per year, while the use of red bronze and composition has been decreased from 908,000 lb. per year to 734,000 lb. per year.

Scrap Brass Converted Into Forging Ingots

In order to utilize the large accumulation of yellow brass scrap resulting from the manufacture of cartridge cases the manufacture of naval brass forging ingots has been further extended, until at the present time practically all the requirements of the forge shop for bronze torpedo forgings are being met by the use of forging ingots manufactured at the gun factory. The recent heavy demand for small-caliber cartridge-case scrap has made possible the developments of the manufacture of cartridge-case slabs in the crucible furnaces in the new experimental plant established under the metallurgical and testing division, which has resulted in a considerable saving to the Government. In this operation crop ends and dirty scrap resulting from the manufacture of large-caliber cartridge cases, and which were formerly considered unsuitable for further use in cartridge-case manufacture, have been melted in natural-draft crucible furnaces, and after careful treatment to free the material from foreign matter, poured into slabs, which have been used with entire success in the manufacture of one-pounder and three-pounder cartridge cases, all of which up to the present time passed proof test satisfactorily.

Operations of the smelting plant at the gun factory have continued with the same satisfactory results as reported during the previous year. Immense quantities of lower grade scrap materials have been reclaimed in the form of usable ingot material for the production of casting and forging ingots, which has resulted in holding the cost of the gun-factory output of non-ferrous castings below the regular market price for similar castings made by outside manufacturers, notwithstanding the increased market value of all non-ferrous metals.

During the past year there has been produced in the smelting plant at the gun factory from scrap metals a total of 1,704,405 lb. of casting ingots, consisting of manganese bronze 703,852 lb., naval brass 468,588 lb., and phosphor bronze or composition 531,965 lb.

Based on the average market value of ingot material of similar characteristics compared with the cost of production of the above ingot material at the gun factory, the operation of the smelting plant has, during the past year, saved the Government approximately \$308,775, which amount would have been absolutely lost had this scrap been sold or given to contractors on reworking contracts. With the installation and equipping of the new smelting plant, and the operation of the electric furnace for scrap recovery, it is believed that it will be possible to make still further progress in the reclaiming of scrap materials, such as light yellow brass scrap, manganese bronze turnings, etc., which will effect considerable additional saving to the Government.

W. L. C.

STATE LABOR EXCHANGES

Co-operation with Federal Government in Labor Matters

WASHINGTON, Dec. 18.—The Council of National Defense has asked the State Councils of Defense to institute labor exchanges throughout their States, in co-operation with the Federal Department of Labor, to meet the rapidly increasing war demands for labor. Already many shipyards are in crying need of workers and in the near future the need is likely to be felt equally by munitions, steel, lumber, mining, transportation and all the other essential industries. Filling this demand is one of the most important tasks of the near future, and it is for this reason that the Council of National Defense and the Department of Labor have settled upon the new plan of labor exchanges.

Every State Council of Defense is being asked by the National Council to appoint a committee to take charge of this work under the leadership of some capable man acceptable to both capital and labor. The Department of Labor plans also to extend its system of exchanges through the funds at the disposal of its War Emergency Employment Service. The War Emergency Employment Service, when this plan is carried into effect, will consist of the United States Employment Service, the Public Service Reserve, the Boys' Working Reserve, and the State Labor Exchange. This whole system will be co-ordinated with the new system of exchanges of the State Councils of Defense, by the appointment by the Secretary of Labor of the chairman of each State Council committee as Federal Director of the War Emergency Employment Service. Thus the national and local machinery will be tied firmly together.

Seven States had already been approached by the Council of National Defense and have already appointed their industrial committees. The new request of the Council brings all the other States of the country in on the labor exchange system.

"The Iron Age's" Pamphlet on Prices of Iron and Steel Products

During the past two weeks, THE IRON AGE has received a very large number of requests for copies of the pamphlet showing prices of iron and steel products, as agreed upon by the Government and manufacturers, and has sent out copies as desired, except that it has been necessary to limit the number sent to any one person. Many very kind letters of thanks and commendation are being received, including the following from the Federal Trade Commission, Washington:

"On Nov. 12, this commission requested some copies of a pamphlet on iron and steel prices, in reply to which it received your letter of Dec. 3, stating that you were sending copies of the document under separate cover. These copies have also been received. The commission finds them so valuable in its work that it is now requesting additional copies. If it is not imposing on good nature, six more copies could be used to very good advantage."

The supply of pamphlets has not yet been exhausted and they will be sent to subscribers as long as there are any left.

The Pittsburgh Knife & Forge Co., N. S., Pittsburgh, has recently bought about 40,000 sq. ft. of ground adjoining its plant that was formerly occupied by the plant of the Diamond Forging & Mfg. Co. which will be used for future extensions. The Pittsburgh Knife & Forge Co. has recently installed some new equipment, consisting of 1500 to 1800-lb. hammers, 5-in. and 2½ in. upsetters, and other miscellaneous tools. The company recently nearly doubled its capacity for the manufacture of drop forgings, car forgings, mine forgings and shear knives.

Iron and Steel Markets

HANDICAPS INCREASED

Output Cut Down in Nearly All Districts

Large Government Orders for Structural Steel— Ferroalloy Imports Under Control

The handicaps on pig iron and steel production have been increased in the past week by heavy snows in the East and Central West, causing fresh shortages in coal and coke. The week's steel output in the Youngstown district has been only about half of the capacity; at Cleveland the American Steel & Wire Co.'s plants were closed down for nine days; in eastern Pennsylvania five furnaces were banked; 20 were banked early this week at Pittsburgh and in the two Valleys; and throughout the country the coal situation of iron and steel works has been either worse or unimproved.

At Chicago, the shortage of coal and coke is cutting down the production of some companies, while all are worried by the smallness of the margin of safety. Six blast furnaces of the Illinois Steel Co. are banked, and one furnace and one mill of the Wisconsin Steel Co. are idle. One new South Chicago stack of the Mark Mfg. Co. will go in blast early in 1918.

Following the Federal Trade Commission's cost conference with iron and steel companies at Washington, on Friday, at which the October increases in production cost were emphasized, the impression has gained strength that no important revision of existing price schedules will be made on Jan. 1. The steel manufacturers' committee met in New York Wednesday, Dec. 19, and a meeting with the War Industries Board at Washington is expected to be held next week.

Government requirements are growing, and in the heavier lines seem all-absorbing, with steel output so much reduced. Large lots of plates are given out each week. In the West an army inquiry for 40,000,000 bolts has come up, and in addition to 7500 tons of rivets bought by the Emergency Fleet Corporation, 6000 to 8000 tons for Eastern shipyards is about to be placed. Of the 1,500,000 tons of shell steel on which the Government wants delivery before June 15, about 1,200,000 tons has now been allotted to the mills.

The Government is about to buy more cars for France, and from 3000 to 9000 four-wheel cars are wanted for Italy.

Work has stopped on Russian locomotives, and many of those already built, but not shipped, may yet be converted for use at home. A large program of locomotive and car building for domestic roads, under Government auspices, is being worked out.

General export business is at a low ebb. Harassed by priority interference at mills, by the scarcity of ocean-vessel space, by delays and refusals of cars, and by frequent changes in regulations, exporters are under pressure from buyers abroad, who try for the agreed price scales. The outlook until after the war, or until Government demand is more accurately measurable, is for thin picking in

exports. One successful release of plates covers 1500 tons for France, done at 4.75c. A French railroad is willing to pay 5c. at mill for some 300 tons.

The volume of structural-steel business for shipbuilding and other Government needs is surprising, but there is an almost total absence of private building work. The Bridge Builders' and Structural Society reports 138,500 tons of shop capacity put under contract in November, more than in any other month this year. The average for the preceding ten months was 94,250 tons. The monthly average of bridge and building work for 1915 and 1916, however, was 124,000 tons.

An example of the large tonnage called for at private works on Government account is 4000 tons just let for a new ordnance plant at Alliance, Ohio. Later building at the same place will require 3000 tons. The leading fabricator will be busy for most of next year on work already in hand, much of it for shipyards.

Sheet bar and billet buying has quieted down, chiefly because so little steel can be had. Some sheet mills have been unable to contract for bars, but are taking what they can get from week to week.

Pig iron consumers feel the situation tightening upon them. Central Western steel companies find it hard to get iron in the market to make up their shortages, but it is known that one of them recently closed for 22,000 tons of basic iron. Forge iron sales of 15,000 to 20,000 tons are reported at Pittsburgh. In the East, where activity has been greatest, the week has been the quietest in a long time.

Pig iron producers are now reporting each week to the Government, giving full data as to sales, production, destination of shipments and stock on hand. This serves to check up priority orders, which every week seem to be covering a larger portion of the output.

All imports of ferroalloys or of their ores, by arrangement between the War Trade Board and importing interests, will be handled by the American Iron and Steel Institute. This was decided at a meeting in New York this week, the plan being identical with that now followed in the case of pig tin. Ferromanganese imports have dwindled to a small figure and at the same time domestic production has declined. There is a further complication from the proposal of the Government to commandeer vessels that have been depended on to bring Brazilian manganese ore to this country.

Pittsburgh

PITTSBURGH, Dec. 18—(By Wire).

Operating conditions in the Pittsburgh and Youngstown districts, and also in other localities, this week are very bad, probably worse than ever before, due to the shortage of coal, natural gas and cars. In the Youngstown district alone it is estimated that 7000 to 8000 men were idle at the first of the week, on account of so many plants being either closed entirely or running short time because of lack of coal. It is probable that output of steel in the Youngstown district this week will not be much above 50 per cent, if that much. All

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Dec. 19,	Dec. 12,	Nov. 14,	Dec. 20,
	1917.	1917.	1917.	1916.
No. 2 X, Philadelphia...	\$34.25	\$34.25	\$34.25	\$29.50
No. 2, Valley furnace...	33.00	33.00	33.00	31.00
No. 2, Southern, C'nti...	35.90	35.90	35.90	25.90
No. 2, Birmingham, Ala...	33.00	33.00	33.00	23.00
No. 2, furnace, Chicago*...	33.00	33.00	33.00	30.00
Basic, del'd, eastern Pa...	33.75	33.75	33.75	30.00
Basic, Valley furnace...	33.00	33.00	33.00	30.00
Bessemer, Pittsburgh...	37.25	37.25	37.25	35.95
Malleable Bess., Ch'go*...	33.50	33.50	33.50	30.00
Gray forge, Pittsburgh...	32.75	32.75	32.75	29.95
Le. S. charcoal, Chicago...	37.50	37.50	37.50	31.75

Rails, Billets, etc., Per Gross Ton:

Bess. rails, heavy, at mill	....	....	....	\$38.00
O-h. rails, heavy, at mill	....	....	....	40.00
Bess. billets, Pittsburgh...	\$47.50	\$47.50	\$47.50	60.00
O-h. billets, Pittsburgh...	47.50	47.50	47.50	60.00
O-h. sheet bars, P'gh...	51.00	51.00	51.00	60.00
Forging billets, base, P'gh	60.00	60.00	60.00	80.00
O-h. billets, Phila...	47.50	47.50	47.50	60.00
Wire rods, Pittsburgh....	57.00	57.00	57.00	70.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia...	3.685	3.685	3.685	3.159
Iron bars, Pittsburgh...	3.50	3.50	3.50	3.25
Iron bars, Chicago...	3.50	3.50	4.50	3.00
Steel bars, Pittsburgh...	2.90	2.90	2.90	3.00
Steel bars, New York...	3.095	3.095	3.095	3.169
Tank plates, Pittsburgh...	3.25	3.25	3.25	4.25
Tank plates, New York...	3.445	3.445	3.445	4.419
Beams, etc., Pittsburgh...	3.00	3.00	3.00	3.25
Beams, etc., New York...	3.195	3.195	3.195	3.419
Skelp, grooved steel, P'gh	2.90	2.90	2.90	2.85
Skelp, sheared steel, P'gh	3.25	3.25	3.25	3.00
Steel hoops, Pittsburgh...	3.50	3.50	3.50	3.25

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Dec. 19,	Dec. 12,	Nov. 14,	Dec. 20,
	1917.	1917.	1917.	1916.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	5.00	5.00	5.00	4.50
Sheets, galv., No. 28, P'gh	6.25	6.25	6.25	6.25
Wire nails, Pittsburgh...	3.50	3.50	3.50	3.00
Cut nails, Pittsburgh...	4.50	4.50	4.50	2.95
Fence wire, base, P'gh...	3.25	3.25	3.25	2.95
Barb wire, galv., P'gh...	4.35	4.35	4.35	3.85

Old Materials, Per Gross Ton:

Iron rails, Chicago...	\$37.00	\$37.00	\$35.00	\$29.00
Iron rails, Philadelphia...	38.00	38.00	38.00	37.00
Carwheels, Chicago...	31.50	31.00	27.75	21.50
Carwheels, Philadelphia...	34.00	34.00	29.00	22.50
Heavy steel scrap, P'gh...	30.00	30.00	29.00	27.00
Heavy steel scrap, Phila...	28.00	28.00	26.00	24.00
Heavy steel scrap, Ch'go...	28.50	28.50	28.00	23.50
No. 1 cast, Pittsburgh...	30.00	29.00	26.00	23.00
No. 1 cast, Philadelphia...	31.00	31.00	30.00	21.00
No. 1 cast, Ch'go (net ton)	24.50	23.50	22.50	16.50
No. 1 RR. wrot, Phila...	35.00	35.00	35.00	27.00
No. 1 RR. wrot, Ch'go (net)	31.25	31.25	31.00	25.00

Coke, Connellsville, Pet Net 'ton at Oven:

Furnace coke, prompt...	\$6.00	\$6.00	\$6.00	\$9.00
Furnace coke, future...	6.00	6.00	6.00	4.00
Foundry coke, prompt...	7.00	7.00	7.00	9.00
Foundry coke, future...	7.00	7.00	7.00	6.00

Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
	23.50	23.50	23.50	32.50
Lake copper, New York...	23.50	23.50	23.50	32.50
Electrolytic copper, N. Y.	23.50	23.50	23.50	32.50
Spelter, St. Louis...	7.50	7.50	7.75	10.00
Spelter, New York...	7.75	7.75	8.00	10.25
Lead, St. Louis...	6.25	6.37 1/2	6.37 1/2	7.40
Lead, New York...	6.40	6.50	6.50	7.50
Tin, New York...	85.50	86.00	73.00	42.37 1/2
Antimony (Asiatic), N. Y.	15.00	15.25	13.75	14.25
Tin plate, 100-lb. box, P'gh.	\$7.75	\$7.75	\$7.75	\$7.00

the steel companies there either have plants shut down entirely or are running very shorthanded. The situation in the Pittsburgh district is so bad that local manufacturing plants, other than those making war munitions, are expecting at any time to receive notice from Washington to close their plants, so that the entire supply of coal and electric energy available may be diverted to the plants making war munitions. Robert J. Bulkley of Cleveland, member of the priorities committee of the Council of National Defense, spent four days here recently investigating the situation, and as a result some local manufacturing plants expect to be compelled to close at any time. The Duquesne Light Co. and the West Penn Power Co. sell electric current to a great many manufacturing plants in the Pittsburgh district, and these two companies have notified many of their customers that on certain days the power will be shut off in different localities, in order to conserve as much electric energy as possible for manufacturing plants that are making war munitions. The coal situation is the worst ever known in this district, and on top of this is a deplorable shortage in cars and motive power. Hundreds of thousands of tons of raw and finished steel are piled up in yards and warehouses, waiting cars for shipment. The operating committee of the Eastern railroads is working hard trying to relieve the situation, but so far has not been able to accomplish very much. It is said there is too much conflict in authority and that this had a tendency to hold back the much needed relief in the present railroad congestion. Local conditions in the steel trade show practically no change. Blast furnaces and steel works are working under severe handicaps and output of pig iron and semi-finished steel is being severely restricted. The famine in supply of pig iron is getting worse and it is impossible to find Bessemer or basic iron in any large quantities, particularly the latter. One Youngstown interest was able to secure some 20,000 tons of basic iron, most of it coming from a near-by furnace. There

is a fair demand for billets and sheet bars, but with very little steel available. New buying in finished steel is light for two reasons: some mills are not anxious to take on more obligations than they have on their books and, on the other hand, consumers are not willing to buy very far ahead, as they feel that prices on steel products may possibly be readjusted to a lower basis on Jan. 1 or shortly thereafter. It is estimated that 75 per cent or more of the new business in the various lines of finished steel products, particularly shell steel and steel plates, being placed with the mills, is on direct or indirect Government orders. Three or four of the larger open-hearth steel plants in the Pittsburgh and Youngstown districts are conserving nearly 100 per cent of their output of open-hearth steel for Government purposes.

Pig Iron.—The famine in supply of pig iron seems to be getting worse and Bessemer and basic pig iron cannot be had, except in occasional very small lots that are picked up here and there. An exception to this is the purchase recently by an open-hearth steel plant at Youngstown of about 22,000 tons of basic iron, 10,000 tons to be furnished by one furnace and the remainder divided among three or four other sellers. The local steel companies are still combing the pig iron markets everywhere trying to find pig iron, but with little or no success. There have been some fairly large sales of forge iron, probably 15,000 to 20,000 tons recently at the official price of \$32 at valley furnace. On the purchase of 22,000 tons of basic iron noted above the regular price of \$33, valley furnace, was paid. It is estimated that at present there are 20 or more blast furnaces in the Pittsburgh, Youngstown and New Castle districts temporarily banked waiting for coke. This is cutting down output of coke very materially in a time when it is so badly needed.

We quote as follows: Basic pig iron, \$33; Bessemer, \$26.30; gray forge, \$32; No. 2 foundry, \$33; No. 3 foundry, \$32.50, and malleable Bessemer, \$33.50, all per gross ton at

Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

Billets and Sheet Bars.—The new inquiry for billets and sheet bars has quieted down, largely for the reason that intending buyers of steel became discouraged in their efforts to find it and withdrew their inquiries. Several Youngstown steel mills and also two or three in the Pittsburgh district, are furnishing Bessemer steel nearly entirely on their contracts for billets and sheet bars, desiring to conserve the last pound of open-hearth steel they can on Government war business. The output of steel in the past week or two has not been more than 75 per cent of normal, if that large, due to the shortage in pig iron and also in coal for firing gas producers. Bessemer steel is now being used for some purposes for which open-hearth steel was formerly used nearly altogether.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$47.50, sheet bars \$51, and forging billets \$60 base, all f.o.b. at mill, Pittsburgh or Youngstown.

Ferroalloys.—Consumers of ferromanganese are getting somewhat worried over the outlook for a full supply in the first quarter and first half of next year, with the result that new inquiry is larger. Prices on 80 per cent domestic ferromanganese range from \$245 to \$250 delivered, some sellers holding for the higher price. We quote 18 to 22 per cent spiegelisen at \$62 to \$65, delivered and prompt 50 per cent Bessemer ferrosilicon at \$160 to \$165, delivered. Most consumers of Bessemer ferrosilicon are covered by contracts at somewhat lower prices, and are getting fairly good deliveries.

We now quote 9 per cent Bessemer ferrosilicon at \$54, 10 per cent \$55, 11 per cent \$58.30, 12 per cent \$61.60. We quote 6 per cent silvery iron \$40, 7 per cent \$42, 8 per cent \$44.50, 9 per cent \$47, 10 per cent \$50. Three dollars per gross ton advance for each 1 per cent silicon for 11 per cent and over. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, these furnaces having a uniform freight rate of \$2 per gross ton, for delivery in the Pittsburgh district.

Structural Material.—Almost no new private work is being placed in this district. However, local fabricating concerns are receiving very heavy Government orders for steel structures of various kinds for war purposes, but under instructions from the Government are not giving out details of these contracts. An inquiry in the market is for 7000 tons of steel for a new ordnance plant to be built by the Morgan Engineering Co. at Alliance, Ohio, for which the George A. Fuller Co., New York, has the general contracts. Local fabricators are filled up for six months or more and the American Bridge Co. has all the structural work on its books it can turn out over the greater part of next year. We quote beams and channels up to 15 in. at 3c. at mill, this being the Government price, but local concerns rolling structural steel are filled up to next July or longer.

Steel Rails.—Some fairly large sales of re-rolled light rails are being made at regular Government prices, but mills rolling new light rails for billets report they are filled up for a year or more. The Carnegie Steel Co. has not taken any contracts for standard section rails for a long time, and has its light rails and standard section rail capacity engaged for the next year or more.

We quote light rails, 25-lb. and heavier, at 3c. per lb.; 16-lb. and 20-lb., 3.45c.; 12-lb. and 14-lb., 3.90c., and 8-lb. and 10-lb., at 4.35c. for full carload lots, f.o.b. Pittsburgh; for less than carload lots, down to and including five gross tons, 0.045c. extra, and small lots under five gross tons, 0.09c. extra, all per lb., f.o.b. Pittsburgh.

Plates.—As the Government demands for plates are steadily increasing, the supply from the mills available for other consumers is getting smaller. Several mills that were recently selling fair size lots of plates for prompt shipment now state they are practically out of the market for next two or three months. There is some new inquiry for steel cars, but very few actual orders are being placed. The Pressed Steel Car Co. has taken 50 hopper cars for the Michigan Alkali Co. We quote 1/4-in. and heavier sheared plates at 3.25c. f.o.b. Pittsburgh, but it would be hard to find any mills that would sell plates for prompt delivery.

Sheets.—The new demand is only fairly heavy, as nearly all of the larger consumers have covered their needs over first half of 1918, except for galvanized

sheets, which were sold only for first quarter delivery. The automobile trade covered some time ago for about a year ahead, but for some time has been holding up shipment to a large extent. Recently a good deal of this tonnage in sheets has been released and is now going forward when cars can be obtained. The car situation is very bad and thousands of tons of sheets are being piled up in warehouses of the mills, awaiting cars for shipment, for which the outlook is not very good. It is very probable that within a short time the Government may direct the mills to shut off shipments of sheets to concerns that are not making products essential to the prosecution of the war. Government prices are ruling firm, and these are given in detail on page 1499.

Tin Plate.—Conditions in the tin plate trade are quiet. The mills are now more concerned in getting output to apply on the contracts for this year's delivery not yet completed, and also on contracts taken for first six months of 1918. More and more Bessemer steel is being used in the manufacture of tin plate than ever before. On account of the heavy demands of the Government on all the mills for basic steel to make war products, a number of the larger tin plate mills are now running almost entirely on Bessemer steel that formerly used largely open-hearth. Several large makers of sheet bars have notified tin plate mills which they supply that in the future they will be able to furnish only Bessemer bars. Mills report there is a good demand for stock items of tin plate, which are moving out freely. We quote coke plate at \$7.75 per base box, f.o.b. Pittsburgh, for Bessemer or open-hearth stock, prices on terne plate being given on page 1499.

Iron and Steel Bars.—Consumers report they are still unable to find any mills that will take their orders for either iron or steel bars for prompt shipment. On steel bars some mills are sold up for practically a year, while the two or three local mills that roll iron bars are pretty well filled up for first three or four months of next year. The large mills rolling steel bars report that specifications against contracts are only fairly heavy. The Government has been a fairly heavy buyer of both iron and steel bars for some months, and its needs will likely increase right along as the war goes on. The new demand for reinforcing bars is quiet, owing to the dullness in the building trade. We quote steel bars at 2.90c. and refined iron bars at 3.50c. in carloads, f.o.b. Pittsburgh.

Wire Rods.—Local makers report the domestic demand for wire rods as heavy, and export inquiry is also active, particularly from Canada. Several local mills are making fairly heavy export shipments of wire rods to France and Italy and also to Canada. Lately there has been some inquiry for soft rods from the Orient, but it is very doubtful whether Government licenses could be secured for shipments abroad to neutral countries. One local maker is filled up on rods over first quarter of 1918, and states it is not quoting on soft rods, but has a limited amount of high-carbon rods to sell. The Government did not fix prices on high-carbon rods, and differentials on these are arbitrary. One leading maker is said to be quoting \$10 above the price of soft rods, but several other makers are quoting much higher figures. Prices on rods are given in detail on page 1499.

Wire Products.—Reports are that the Government recently placed contracts for 76,000 kegs of wire nails among the different mills to be shipped as fast as possible. One local mill took 7600 kegs of this order, while a Youngstown mill is said to have taken 25,000 kegs of the order. The domestic demand for wire and wire nails is active, but the output of wire nails has fallen off to some extent on account of the scarcity of steel. One large maker reports it is diverting all the Bessemer steel possible to its wire mills, conserving its open-hearth steel for Government work. Another concern is quoting on Bessemer wire, and has practically stopped making basic wire. There is also a fairly heavy export demand, but Government permits for export shipments are almost impossible to secure, except where it can be shown that the nails and wire are to

be used for war purposes. The trade here does not believe that the War Industries Board will make any changes in prices on wire products about Jan. 1, as reported. Prices on wire and wire nails quoted by all the mills are given on page 1499.

Nuts and Bolts.—The private demand is quiet, practically all the new business being placed for nuts and bolts being Government direct or indirect orders. The scarcity of cars is holding up shipments, but makers report deliveries of steel are fairly good. Government discounts fixed some time ago are given on page 1499.

Rivets.—Makers report the domestic demand very dull, nearly all the new buying being done by the Government on direct or indirect orders. The car situation is bad and is holding up shipments to a very great extent. There is some export demand, but Government permits are very hard to obtain. We quote structural rivets at \$4.65 and iron head boiler rivets at \$4.75 in carloads, f.o.b. Pittsburgh.

Hoops and Bands.—None of the mills rolling hoops and bands has any to offer for early delivery, so that the Government prices of 2.90c. on steel bands and 3.50c. on steel hoops are largely nominal. Mills have covered their trade for some months, and specifications are fairly heavy. The Government prices on steel bands are 2.90c., extras as per the steel bar card, and 3.50c. on steel hoops, f.o.b. Pittsburgh.

Shafting.—Makers report there is very little new buying by the general trade, nearly all the new business being placed coming from the Government on direct and indirect orders. It is said that fully 75 per cent of the output of shafting at present is now going to the Government. The output has been materially decreased for some time, owing to labor troubles at two or three of the larger plants that make shafting. We quote cold-rolled shafting in large and small lots at 17 per cent off list, f.o.b. Pittsburgh.

Cold-Rolled Strip Steel.—The new demand from domestic consumers is quiet, and they do not show much desire to contract ahead, feeling that prices will not be any higher, but on the contrary, may possibly be revised to a lower base. On contracts placed some time ago specifications are fairly active. The new demand from the automobile builders is dull, but several makers report that in the past week it has picked up some.

We quote cold rolled strip steel at \$6.50 and hot rolled at \$4.50 per 100 lb., f.o.b. Pittsburgh, terms 30 days, less 2 per cent off for cash in 10 days, when sold in quantities of 300 lb. or more.

Hot-Rolled Strip Steel.—The new demand is only fair, and makers say that the Government price is being very firmly held. We quote hot-rolled strip steel at \$4.50 per 100 lb., f.o.b. Pittsburgh.

Railroad Spikes.—Makers report the new demand from the railroads is very dull, and specifications against contracts placed some time ago are very quiet. Jobbers are buying at a fairly active rate.

We quote standard sizes of railroad spikes at 4.50c.; $\frac{1}{2}$ -in. railroad spikes, 5.50c. base; $\frac{3}{4}$ -in. and 7/16 in., 6c. base; 5/16-in., 7c. base, per lb., f.o.b. Pittsburgh.

Wrought Pipe.—As yet, the Philadelphia Co. has not placed any part of its order for 20,000 tons of iron and steel tubular goods, but states that it expects to divide this order among five or six different mills the latter part of this week. The new demand for iron and steel pipe from the domestic trade is quiet, but the mills are filled up for months on contracts. Shipments are held up very much by the bad car situation, and many thousands of tons of pipe are piled in warehouses awaiting cars for shipment. Two leading makers of steel pipe say that they have obligations on their books, with orders that will come in from their regular trade, practically taking their entire output of pipe over all of next year. The Government is placing some fair sized orders for steel pipe, but has not placed any very large contracts lately. The new demand for butt-weld pipe is dull, owing to the large falling off in building operations. Discounts on iron and steel pipe are given on page 1499.

Boiler Tubes.—Makers of iron and steel tubes and also seamless tubing report that their output is sold up for so many months that they are not able to take

on orders for prompt shipments. Demands of the Government on the mills rolling iron and steel tubing have been very heavy for some months, and are likely to get still heavier as the shipbuilding program of the Government develops. Government discounts on iron and steel tubing fixed recently are given on page 1499.

Coke.—The car situation and the labor supply in the coke regions were worse last week than at any time for some months, and the outlook for betterment in the near future is very dark. On Monday and Tuesday of last week the weather in the coke regions was below zero, with the result that hundreds of men did not report for work. On Monday one of the largest coke operators was able to load only four cars of coke. In the latter part of the week the conditions were better, the car supply varying from 30 to 70 per cent. Operators claim they are making plenty of coke to supply the blast furnaces with all they need, if they could only get cars, but it is very rarely that they are able to get more than about 50 per cent of the cars needed, and often the supply is less. Some of the furnace coke is being sold for prompt shipment at the regular Government price of \$6 per ton, but very little. One leading coke producer has four or five contracts going into effect on Jan. 1 at \$9 per net ton at oven, \$3 per ton above the official price. The consumers who made these contracts would be perfectly willing to pay the \$9 price if they were sure they would get coke as fast as they need it. One large operator has a contract with an Eastern consumer for coal at \$5 per ton, but this expires Dec. 31. Efforts of brokers to induce the Federal Trade Commission to allow the commission of 25 or 30 cents per ton for selling coke have not yet been successful. A large number of blast furnaces in the two valleys and some in the Pittsburgh district are being banked from one to three days per week waiting for coke to arrive, the Carnegie Steel Co. alone having about a dozen furnaces banked awaiting coke. We quote furnace coke at \$6, foundry \$7 and crushed coke from one inch size \$7.30, all per net ton, ovens. The Connellsville Courier gives the output of coke in the Upper and Lower Connellsville regions for the week ending Dec. 8 as 307,903 net tons, an increase over the previous week of 12,587 net tons. The output for week ending Dec. 15 will likely be much smaller than for the previous week, owing to the severe cold weather.

Old Material.—The railroad situation is reported by scrap dealers to be steadily getting worse, and leading dealers in this city are almost out of business. The railroads demand the war order number before they will issue a permit for a car to be loaded, and even after this is furnished by the dealer it very often happens that the railroad will not furnish the cars. Railroads under no circumstances will furnish cars for shipping scrap that is not to go into the manufacture of war materials. This condition, which has ruled here for a month or more, has cut down very materially the stocks of scrap in consumers' yards, and they are all running short. Consumers would willingly pay Government prices for scrap, but dealers say they cannot buy it at the Government prices, and they are not trying to do business. Two local open-hearth steel companies are very short of scrap and have had to shut down temporarily some open-hearth furnaces, waiting for scrap to arrive. Dealers claim they are not trying to sell above the Government prices, and if they have to pay these prices to get material, and then sell it at the same figures, they are better off without the business. No sales of scrap of moment have been made in this market for several weeks or more. The committee from the Scrap Dealers' Association that was in session recently with the sub-committee on scrap iron of the American Iron and Steel Institute also was in conference with the War Industries Board at Washington, but no definite action was taken. The scrap dealers believe they should be allowed a commission of say 5 per cent on material sold to consumers at the same prices they pay for it, but no action on this request was taken by the War Industries Board. Some dealers that have scrap sold on old contracts at higher than the Government prices are not delivering according to contract, as they say they cannot buy the material. None of

the grades of scrap on which the Government fixed prices is selling below these prices, and it would bring much higher figures were it not for the Government restrictions surrounding the market. Dealers quote for delivery in Pittsburgh and other consuming points that take Pittsburgh freight rates, per gross ton, as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered	\$30.00
No. 1 foundry cast	30.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa., and Pittsburgh	38.00 to 39.00
Hydraulic compressed sheet scrap	26.00 to 27.00
Bundled sheet scrap, sides and ends, f.o.b. consumer's mill, Pittsburgh district	24.00 to 25.00
Bundled sheet stamping scrap	21.00 to 22.00
No. 1 railroad malleable stock	37.00 to 38.00
Railroad grate bars	19.00 to 20.00
Low phosphorus melting stock	38.00 to 40.00
Iron car axles	42.00 to 43.00
Steel car axles	43.00 to 44.00
Locomotive axles, steel	51.00 to 52.00
No. 1 busheling scrap	19.00 to 20.00
Machine shop turnings	20.00
Cast-iron wheels	33.00 to 34.00
Rolled steel wheels	36.00 to 37.00
*Sheet bar crop ends	37.00 to 38.00
Cast-iron borings	20.00
No. railroad wrought scrap	35.00
Heavy steel axle turnings	25.00 to 26.00
Heavy breakable cast scrap	26.00 to 27.00

*Shipping point.

Chicago

CHICAGO, Dec. 18.—(By Wire).

With some companies the shortage of coal and coke is cutting down production, while with all the margin of safety is so small as to cause worry. For lack of coal, six furnaces of the Illinois Steel Co. are down, two at Joliet, one at Gary and three at South Chicago. In three or four days, only coal enough for one day has been shipped, not because of the lack of coal, but because of the difficulty in moving it, the lack of cars. The Wisconsin Steel Co. banked two furnaces and shut down two mills last week for lack of coal and coke, but one mill and one furnace started again this week. The outlook is dubious, and this despite the fact that the company has war orders.

Pig Iron.—Northern iron is practically sold up for the first half, but two brands of southern can be had in various silicones for future delivery. Some southern producers are out of the market. The scarcity of malleable Bessemer is causing consumers to turn to charcoal iron, of which a little is available. A maker reports inquiries so heavy that were he disposed to care for them, he could sell all he has in a few hours, but he is saving his iron for regular customers. There are charcoal inquiries for last half, but the books have not yet been opened for that period. Silveries and almost unobtainable. Stack No. 1 of the Mark Mfg. Co. will go in blast early in 1918. Prices are unchanged as follows:

Lake Superior charcoal, Nos. 2 to 5	\$37.50
Lake Superior charcoal, No. 6 and Scotch	40.00
Northern coke foundry, No. 1	33.50
Northern coke foundry, No. 2	33.00
Northern coke foundry, No. 3	32.50
Northern high-phosphorus foundry	33.00
Southern coke No. 1 foundry and 1 soft	38.50
Southern coke No. 2 foundry	37.00
Malleable Bessemer	33.50
Basic	33.00
Low-phosphorus (copper free)	53.00
Silvers, 7 per cent	44.54

Ferroalloys.—Eighty per cent ferromanganese is firm at \$240. Contracts for 50 per cent ferrosilicon are being renewed, with carloads quoted around \$155 delivered.

Plates.—Government business is large and is placed without warning. Recordable last week was the placing of 5000 tons with the leading independent mill by the Emergency Fleet Corporation. The same mill this week was allotted 5600 tons of plates, shapes and bars by the Fleet Corporation, also a lot of plates. Inquiry calls for 6100 tons of armor plate of alloy steel for tractors or tanks. Eastern mills are selling a few plates. Prices are unchanged. For material out of warehouse, the quotation is 4.45c.

Bars.—This product is more easily obtained than others. The agricultural implement makers are specifying freely and placing some new business. Iron and hard steel bar mills are operating single turn only, though bar iron is a little more active at 3.50c. Hard steel bar prices remain unfixed, but are expected to settle at 3c.

We quote warehouse prices for Chicago delivery as follows: Soft steel bars, 4.10c.; bar iron, 4.10c.; reinforcing bars, 4.10c.; base, with 5c. extra for twisting sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting list plus 10 per cent.

Structural Material.—Local fabricators are employed on Government work. New projects are few. The Illinois Central has asked for revised bids on 1000 hopper cars. The American Bridge Co. will supply 226 tons for five girder bridges for the M. K. & T. Ry. of Texas. The Illinois Steel Bridge Co. will supply 165 tons for the Deering mines, Eldorado, Ill. United States warehouse addition at San Francisco, requiring 250 tons, goes to concrete. Wendnagel & Co., Chicago, have the contract for 1000 tons for the Englewood High School and also will supply 150 tons for a Chicago theater. Prices are unchanged. For material out of warehouse jobbers quote 4.20c.

Sheets.—The principal local maker has only blue annealed to sell. Another company has black and galvanized for first quarter, but is scanning inquiries closely, and reporting sales to the Government. Government prices prevail

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 3.45c.; No. 28 black, 6.45c.; and No. 28 galvanized, 7.70c.

Cast Iron Pipe.—Winnipeg, Man., postpones the placing of 4500 tons to Jan. 4, making the fourth postponement. Propositions are few and small and some pipe shops are shutting down.

Quotations per net ton, Chicago, are as follows: Water pipe, 4-in., \$58.50; 6-in. and larger, \$55.50, with \$1 extra for Class A water pipe and gas pipe.

Wire Products.—Market active, especially in fencing. There is no change in prices.

Nails, \$3.50, Pittsburgh; plain fence wire, \$3.25; painted barb wire, \$3.65; galvanized barb wire, \$4.35; polished staples, \$3.65, and galvanized staples, \$4.35.

Bolts and Nuts.—A current inquiry calls for 40,000,000 bolts, representing about \$1,000,000. For prices and freight rates see finished iron and steel, Pittsburgh, page 1501.

Store prices are as follows: Structural rivets, 5.50c.; boiler rivets, 5.60c.; machine bolts up to $\frac{3}{4}$ x 4 in., 37 $\frac{1}{2}$ per cent off; larger sizes, 25-5; carriage bolts up to $\frac{3}{4}$ x 6 in., 30-2 $\frac{1}{2}$; larger sizes, 20; hot pressed nuts, square tapped, \$1.05 off, and hexagon tapped, 85c. off per 100 lb.; coach or lag screws, gimlet points, square heads, 40 per cent off.

Old Material.—Scarcity of cars is halting shipments, but difficulty in shipping east prevents scarcity in this market. The Steel Corporation is buying heavily, paying the same price for heavy melting, shovelling and frogs, switches and guards. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	\$37.00 to \$38.00
Relaying rails	50.00 to 55.00
Old carwheels	31.50 to 32.50
Old steel rails, rerolling	35.50 to 36.50
Old steel rails, less than 3 ft.	33.50 to 34.50
Heavy melting steel scrap	28.50 to 29.00
Frogs, switches and guards, cut apart	28.50 to 29.00
Shoveling steel	28.50 to 29.00
Steel axle turnings	23.00 to 24.00

Per Net Ton	
Iron angles and splice bars	\$36.50 to \$37.50
Iron arch bars and transoms	37.50 to 38.50
Steel angle bars	26.00 to 27.00
Iron car axles	45.00 to 46.00
Steel car axles	43.50 to 44.50
No. 1 railroad wrought	31.25
No. 2 railroad wrought	29.00 to 30.00
Cut forge	29.00 to 30.00
Pipes and flues	22.00 to 23.00
No. 1 busheling	25.00 to 25.50
No. 2 busheling	17.50 to 18.00
Steel knuckles and couplers	32.00 to 33.00
Coil springs	39.00 to 40.00
No. 1 boilers, cut to sheets and rings	19.00 to 20.00
Boiler punchings	31.50 to 32.50
Locomotive tires, smooth	33.50 to 34.50
Machine-shop turnings	16.75 to 17.25
Cast borings	16.00 to 16.50
No. 1 cast scrap	24.50 to 25.50
Stove plate and light cast scrap	19.00 to 20.00
Grate bars	19.00 to 20.00
Brake shoes	20.00 to 21.00
Railroad malleable	27.50 to 28.50
Agricultural malleable	23.75 to 24.75
Country mixed scrap	19.50 to 20.50

Rails and Track Supplies.—Some standard seconds have been placed around \$65, and about 500 tons of standard section rails at about \$70. Mills are discouraging 1919 inquiries for rails.

Standard railroad spikes, 4.50c. to 5c., base; small spikes, 4.75c. to 5.50c., base; track bolts with square nuts, 5.50c. to 6c. all in carloads, Chicago; tie plates, \$70 to \$80 f.o.b. mill, net ton; standard section Bessemer rails, Chicago, \$38 base (nominal); open hearth, \$40 (nominal). For prices of light rails see finished iron and steel, Pittsburgh report.

Philadelphia

PHILADELPHIA, Dec. 18.

The situation is very acute in this territory among blast furnaces and steel mills because of coal and coke shortage, attributed almost entirely to the congestion of railroad traffic. Several blast furnaces are banked. A large manufacturing plant, that of Henry Disston & Sons, Inc., at Tacony, has been forced to shut down because of lack of coal. The Alan Wood Iron & Steel Co. is on the verge of shutting down its entire plant and already has one of its two blast furnaces and several of its open hearth furnaces out. The Lukens Steel Co. is suffering severely from lack of gas coal and to-day expected to be forced to suspend operations at any time, its coal supply being about sufficient for one day's operation. Railroad embargoes are working a hardship, though intended as a means of relieving the freight congestion. A dozen different factors contribute to decreased production in all branches of iron and steel manufacturing, with no effective form of relief in sight as yet. Supplies of coke to the blast furnaces were beginning to come somewhat more freely when cold weather and snow storms upset all calculations. Effects of the recent cold and snow have been widespread and serious. An eastern Pennsylvania steel company estimates that its December production will be only 60 per cent of its capacity. The larger plants are doing much better than this, of course, but all of the companies which are not self-contained in coal and coke supply are suffering severely and will doubtless continue to do so. During the past week, there has been very little selling of pig iron, aside from one lot of 4000 tons of basic and another lot of 1000 tons of low phosphorus iron, the latter for immediate delivery.

Coke.—No coke is being sold in this market except for delivery late into next year. Coke sellers restrict contracts very largely to old customers. We quote blast furnace coke at \$6 and 72-hr. foundry coke at \$7, ovens.

Ferroalloys.—Ferromanganese is stronger, its strength being derived largely from the fact that sellers expect ore shipments to decrease, and hence are not disposed to make offerings at the concessions which recently have been easy to obtain. A principal seller in this market announces \$250 as its minimum quotation for any delivery, though \$245 could possibly be done in some quarters. Spiegeleisen is firm in sympathy with ferromanganese, the minimum being \$60 at furnace, but sales of small lots have been made above this figure. Ferrosilicon, 10 to 14 per cent, is very scarce; in fact, prospective buyers have been unable to procure any in this market. The 50 per cent is hard to get and commands a price ranging from \$175 to \$185.

Billets and Slabs.—There is practically no demand for billets, slabs and blooms, and it would be difficult to find a mill in this territory willing to quote. The market is nominal at the Government price of \$47.50, Pittsburgh, per ton.

Sheets.—There continues to be some selling of sheets for first quarter delivery, a single sale of 1000 tons of high carbon sheets having been made last week to a railroad company. A leading sheet producer in this district is selling subject to delays in delivery. We quote No. 10 blue annealed at 4.25c., Pittsburgh; No. 28 black at 5c. and No. 28 galvanized at 6.25c.

Structural Material.—Steel building work, except for the Government, is almost at the vanishing point. The \$10,000,000 plant which was to have been erected by the Philadelphia Electric Co. has been abandoned until after the war, according to an announcement ap-

pearing in to-day's newspapers. Preliminary construction work had been started by the Stone & Webster Engineering Corporation. The building plans at first provided for steel, then the plans were changed to reinforced concrete. Shapes are being shipped in large tonnages to fabricating plants, which are at work for the American International Shipbuilding Corporation's Hog Island plant. Twenty-five of the first 50 vessels to be built by this shipyard are being fabricated in the shops of the McClintic-Marshall Co. The fabricating contracts given out cover 120 vessels, 50 of which are to be delivered to the Shipping Board by Nov. 1, 1918. This record, however, will probably be exceeded. The second lot of vessels is 70 trooperships of special construction. The first keel will be laid at the Hog Island shipyard on Jan. 1, and a keel will be laid about every three days thereafter until the 50 shipways are all busy. The Bethlehem Steel Products Co. has been organized as a subsidiary of the Bethlehem Steel Corporation and will handle its warehouse business, which will be housed in a separate building at South Bethlehem, Pa. We quote shapes at 3c., Pittsburgh.

Plates.—Except for Government work, there is practically no business being done in plates in this market. There is a good inquiry for first quarter delivery, on which mills generally decline to quote unless a priority order from Washington is furnished. Some sellers of plates believe that the War Industries Board may permit a higher price to be charged after Jan. 1, but others think this a forlorn hope. The general opinion is that prices will be left where they are. No one believes that any steel prices will be reduced, and few think it possible that the War Industries Board will agree to any substantial advances. The new plate mill of the Penn Seaboard Steel Corporation, near New Castle, Del., will be ready for operation in four or five months, if present plans are successfully carried out. The Government has given an eastern Pennsylvania steel company an order for 500 gondola cars. Inquiry is also being made for 3000 to 9000 small four-wheel cars for Italy. We quote plates at 3.25c., base, Pittsburgh.

Iron and Steel Bars.—A fair business is being done in bar iron, but sales of steel bars, except occasional lots of concrete reinforcing bars, are practically nil. We quote steel bars at 2.90c., Pittsburgh, and bar iron at 3.50c., f.o.b. mill or Pittsburgh.

Old Material.—Mills are willing to buy and dealers are willing to sell, but very little business is being done because buyers and sellers have not been able to get together as to the price, particularly of heavy melting steel. Eastern Pennsylvania mills a week or so ago were paying \$28, and since then sales have been made at \$29. Some dealers believe that the mills must eventually pay \$30, and they are not anxious to sell now below that price. The strength of the market is due to the great need of scrap by the mills, most of which are short of pig iron. The smaller dealers are holding their stocks for all that they can get. Generally they are not willing to sell at a figure very much below the \$30 fixed as the maximum by the committee of the American Iron and Steel Institute and the War Industries Board. Large dealers must therefore accept a very small margin of profit or do no business at all. We quote the following prices for delivery in eastern Pennsylvania:

No. 1 heavy melting steel	.....	\$28.00 to \$30.00
Steel rails, rerolling	.....	38.00 to 40.00
Low phosphorus heavy melting	.....	36.00 to 38.00
Old iron rails	.....	38.00 to 40.00
Old carwheels	.....	34.00 to 36.00
No. 1 railroad wrought	.....	35.00
No. 1 yard wrought	.....	33.00 to 35.00
No. 1 forge fire	.....	23.00 to 24.00
Bundled sheets	.....	23.00 to 24.00
No. 2 busheling	.....	15.50 to 16.50
Steel turnings (for blast furnace use)	15.50 to	16.00
Machine shop turnings (for rolling mill use)	18.00 to	19.00
Cast borings (for blast furnace use)	15.50 to	16.00
Cast borings (clean)	.....	20.00
No. 1 cast	.....	31.00 to 33.00
Grate bars	.....	21.50 to 22.50
Stove plate	.....	22.00 to 22.00
Railroad malleable	.....	30.00 to 32.00
Wrought iron and soft steel pipes and tubes (new specifications)	.....	30.00 to 32.00

Pig Iron.—Troubles due to shortage of coke are more acute among eastern Pennsylvania blast furnaces than at any time this winter. Several furnaces are banked,

including one at Worth Brothers plant at Coatesville, one at the works of the Alan Wood Iron & Steel Co., and the Macungie, Crane and Tipton furnaces in Pennsylvania. The Oxford furnace in New Jersey is running on about one-half capacity. In addition to troubles in production, the furnaces are having difficulty in making shipments, owing to the railroad embargoes. Nearly all of the Eastern roads now limit shipment to consignees who are engaged in making supplies for the United States Government. Many foundries, which are engaged on war work indirectly, are finding it difficult to obtain shipments because they have no Government order number. In nearly all instances, a Government envelope must now be attached to the car in which pig iron is shipped. Full information must be given to the railroad as to what the iron is to be used for. A case is cited of a foundry making application for priority shipment of 100 tons of iron, when, upon investigation, it was found that the actual Government work on hand would take just about one-half ton of iron. The 100 tons was not shipped. It grows more difficult for foundries to supply their private needs through the instrumentality of a Government order. Blast furnaces are now required to send weekly statements to J. Leonard Reppole, Director of Steel Supply, War Industries Board, and a duplicate to James B. Bonner, vice-chairman of the sub-committee on steel distribution of the American Iron and Steel Institute, similar to the reports which have been obtained from steel producers for some time past. These reports give figures as follows: (1) Tonnage brought forward from last week; (2) tonnage received during week; (3) total tonnage; (4) tonnage shipped during week; (5) tonnage cancelled during week; (6) total outstanding tonnage at end of week; (7) tonnage produced last week; (8) stock on hand; (9) total number of furnaces; number in blast; if reduced output, state cause. The report covers basic, Bessemer, foundry, malleable, low phosphorus, Bessemer ferrosilicon, and high silicon grades, spiegeleisen, ferromanganese and all other iron, including off iron. These reports, it is intimated, will assist the Director of Steel Supply in allotting iron to companies engaged on war work which need it badly, or in commandeering iron for the Government when necessary. They will also help to determine whether there is a genuine scarcity of iron, so far as the amount available for actual operations is concerned, or a theoretical scarcity based on the fact that recent demand has been greater than the apparent supply. Pig iron sellers maintain that there will not be enough iron for all users during 1918 and that many plants, particularly foundries, will be obliged to do without, and in many instances shut up shop until supplies can be produced. There is no doubt that the situation might be partially solved if there were immediate improvement in railroad transportation so that coke and other blast furnace supplies would be readily available, but under present conditions it is obvious that for some months the demand for iron will continue to exceed the supply. Practically all furnaces are sold up for the first half of 1918 on all grades of iron. Some foundry iron is available for second quarter. Sales of iron during the week were at low ebb, with the exception of one lot of 4000 tons of basic for next year and a lot of 1000 tons of low phosphorus iron for prompt delivery, negotiations for which were begun the week previous. It is understood that the National Radiator Co. is still unable to procure all of the 12,000 tons of foundry iron it needs for next year because it is not on war work. Requests for priority shipments from Washington are becoming more frequent and shipping schedules of the furnaces are considerably disturbed. In at least a few instances, furnaces still owe iron which was scheduled for shipment last July. As the needs of war contractors for iron grow more acute, further upsetting of shipments on regular contracts is to be expected. We quote the following standard grades of iron f.o.b. furnace, to which freight to destination should be added:

Eastern Pennsylvania No. 1 X.	..	\$34.50
Eastern Pennsylvania No. 2 X.	..	33.50
Eastern Pennsylvania No. 2 foundry.	..	33.00
Virginia No. 2 X.	..	33.50
Virginia No. 2 foundry.	..	33.00
Basic	..	33.00
Gray forge	..	32.00
Bessemer	..	36.30
Standard low phosphorus	..	53.00
Low phosphorus (copper bearing)	..	50.00

Birmingham

BIRMINGHAM, ALA., Dec. 18

Pig Iron.—The Southern pig iron market shows very little change. Sales in small lots are still being made with a small portion only of the probable make during the first half of the coming year left to be offered and deliveries being a hard proposition. Car shortage and embargoes on connecting lines prevent furnace companies in this section of the country shipping as much iron as they would like. Accumulated stocks of iron remain about the same as they were four to six months ago. The Federal price schedule is being strictly maintained, even home consumers not being accommodated with concessions. Inquiries are numerous and requests are being made for last half of next year, but no sales are known for that period. As before, attention is being given to production in this territory and with some success. The Republic Iron & Steel furnaces at Thomas are doing well; the Sloss-Sheffield Steel & Iron Co. is repairing its No. 1 Hattie Ensley furnace at Sheffield and the new No. 2 Hattie Ensley is making iron. This furnace will have a daily capacity of 275 tons. The Woodward Iron Co., Alabama Co., Tennessee Coal, Iron & Railroad Co. and others all report production somewhat improved with prospects of last half of month showing gains over the first half, despite the fact that the holiday season always sees more or less lagging on the part of labor.

Coal and Coke.—Coal production is still being maintained well in this state, though there is loud complaint that labor is not doing all it can toward a better production. Federal instructions as to deliveries are interfering a little with the regular business though not in the aggregate production by any means. Satisfaction is expressed over the agreement arrived at between the union miners' organization and the Alabama coal operators' association in conferences at Washington last week and this removes all prospects of trouble between the two interests. Coke production is off a little in this state, said to be caused by uncertainties in coal deliveries. No contracts are being taken by coke producers, though sales are made now and then, mainly in small lots. The belief is held here that there may be an upward revision in the price schedule by the Government before long.

Old Material.—The scrap iron and steel market in the Southern territory is being held back by the car situation. Even country scrap is being gathered and cannot be brought to the dealers' yards. Inquiries are in hand for a large quantity of scrap to go into other districts, but delivery cannot be guaranteed, hence that trade cannot be accepted. Southern consumers of scrap are yet considerably below the Government prices. For instance there is no willingness to pay any more than \$22.50 per ton for heavy melting steel, and hardly that price, though the Government fixed \$30 as the price, at delivery point. Quotations for scrap iron and steel are about holding their own. Following prices are noted:

Old steel axles	..	\$32.00 to \$33.00
Old steel rails	..	28.00 to 30.00
No. 1 cast	..	24.00 to 26.00
Machine turnings	..	17.50 to 18.50
Cast iron borings	..	13.00 to 15.00
Railroad wrought No. 1	..	28.00 to 35.00
Old car wheels	..	25.00 to 30.00
Tramcar wheels	..	21.00 to 25.00
Heavy melting steel	..	21.50 to 22.50
Stove plate	..	18.50 to 20.00

San Francisco

SAN FRANCISCO, Dec. 10.

The situation in this market is one of unrest and uncertainty. Unrest, because although the Government has fixed the price on many raw and fabricated articles, they cannot be delivered in most cases, on account of the unfavorable freight situation and the inability of the Eastern mills to fill orders promptly. Uncertainty, because the jobbers seem to be beyond Government control, and, in some cases at least, are inclined to charge all they can get. Most of the jobbers are adjusting their prices to those established by the Government, but a sale of three cars of coke at \$30.00 a ton is reported in one instance. A jobber's price of 4.70c. on bars and structural material has been agreed to and a meeting to be held in a day or two is ex-

pected to fix a price of 8.40c. on sheets and 5.05c. basis on galvanized plates. These prices will probably be generally adhered to as long as the jobbers can get their material at the Government prices. The advance in railroad freight rates on Western shipments will of necessity advance the prices to the consumer. It is not known here when these advances go into effect or what they amount to. The increased freight rate may have a beneficial effect on the local mills, for it should allow them to make a larger profit on rolled steel, bars and shapes, which is about all they handle that would likely be affected by the increase. As an evidence of the seriousness of the freight situation, it may be stated that the Western Pacific Railroad cannot get through a considerable shipment of structural steel for building bridges which has already been fabricated in the East, but cannot be shipped for lack of cars. With the railroads themselves on the "waiting list" the ordinary builder realizes that prompt deliveries are out of the question.

Bars.—Most of the local mills are not quoting bars until after the first of the year. By that time it is expected that the new railroad rates will be in effect. The Eastern representatives are quoting at the Government figure, but cannot promise deliveries under six months or more. The Government price is 3.65c. f.o.b. San Francisco, and the demand is heavy. The principal local dealers have established a jobbing price of 4.70c., which is somewhat lower than two weeks ago.

Structural Material.—The demand for structural material is almost exclusively from the Government or for governmental purposes. There are practically no new buildings requiring structural steel now being planned and what building is going on is mostly of reinforced concrete. The metal for these structures is fabricated in the local mills. Structural steel now in the jobbers' hands is quoted at the same price as bars. Small shapes range up to 5.00c.

Plates.—The market for plates, outside of Government demand, is very uncertain. For domestic use, they are selling from 4.05c. to 4.80c. f.o.b. San Francisco. Jobbers are selling on 5.05c. base.

Sheets.—The lower prices established by the Government for sheets has resulted in bringing about an increased demand. This it is impossible to meet on account of the shortage of freight cars. Nearly all the plate reaching this territory is for Government uses. The jobbers still have a stock which they are constantly trying to maintain. The jobbers' price recently established was 8.60c., but it is expected to be 8.40c. after the coming meeting of the jobbers.

Wrought Pipe.—The situation for wrought pipe in this market is unchanged. The Government is taking practically the entire output and the mill representatives are not catching up on their shortage of stock. The jobbers are selling what little stock they have in strict accordance with the Government prices.

Cast Iron Pipe.—The market for cast iron pipe is quiet. Only one job of material size is in sight. The Department of Public Works of Los Angeles has been receiving bids for 321 tons of 4-in., 8-in. and 10-in. pipe, but has not yet awarded the contract. Phoenix, Ariz., is in the market for 28 tons of 6-in. pipe. There is no demand from private corporations. Prices remain unchanged.

Pig Iron.—The demand for all grades of pig iron remains strong. Some Alabama furnaces are quoting Government prices for deliveries during the first half of next year. For immediate deliveries a little higher price is being offered. Malleable users are asking further supplies, the inquiry for this grade being stronger than for foundry iron. The demand is strong for pig of a higher silicon or manganese content, and the price increases as these contents become greater. Several large orders recently have been given for pig in this market, due to a great extent to the amount of Government work going on about the Bay. As this Government work increases here and in other Pacific Coast foundries the demand for iron of certain analysis to meet the Government requirements will show a corresponding increase.

Coke.—Coke is much in demand in this market and is very hard to obtain in grades satisfactory to the trade. The mills in the Bay region are willing to pay far more than the Government price if they can obtain the quality that they want.

Old Materials.—The market for scrap is heavier and prices, while they were unchanged, show a downward tendency. The supply on hand seems sufficient to take care of all demands. No. 1 machinery scrap brought from \$32.00 to \$35.00. About once a month 300 or 400 tons of steel scrap arrives from Mexico by steamer. But the quantity coming in this way is not enough to have any material influence on the quotations.

Buffalo

BUFFALO, Dec. 18.

Pig Iron.—It is almost impossible for users to place orders with Buffalo district furnaces for iron for delivery before July 1, and unless the situation respecting the getting in of coke and other raw materials is speedily improved, the outlook is that genuine famine conditions will prevail. A marked curtailment in production has resulted from the serious handicap many furnaces are laboring under from the blocking of transportation facilities. One producing interest reports that it has been practically closed for about a week. It is now barely running and may be obliged to bank again in a day or two if coke does not come forward meantime. Another producer reports a little selling is being done for last half, under special conditions, almost entirely to old customers depending upon this interest for supplies. The aggregate of its sales for the week was about 2000 tons, foundry grades. As a rule, furnaces are not at this time disposed to contract for last half except in a very small and conservative way. There has been no change in prices and we continue the schedule in force for the past few weeks, as follows, f.o.b. furnace, Buffalo:

No. 1 foundry	\$34.50
No. 2 X	33.50
No. 3 foundry	32.50
Gray forge	32.00
Malleable	33.50
Basis	33.00
Lake Superior charcoal, f.o.b. Buffalo	39.75

Finished Iron and Steel.—Selling conditions seem to be somewhat chaotic, due to traffic congestion and inability of mills to secure sufficient fuel to keep them operating. There are quite a number of inquiries before the market and some sales of restricted sizes of steel bars are noted. The Government is taking large tonnages of plates and shapes and of large rounds, with the prospect that after the first of the year there will be even heavier demands for plates and shapes than at present. Priority orders are filling up mills to an increasing extent.

Old Material.—As a result of the shortage of pig iron there has been a large increase in demand for cast scrap. This and the activity in demand for heavy melting steel, in which commodity scarcity is becoming a more and more pronounced feature, is causing the whole list to become stronger. Machine shop turnings, heavy axle turnings, bundled sheet scrap and No. 1 busheling, particularly, show more active demand. The inquiry for heavy melting steel is so great that dealers believe the price would speedily reach \$50 if left to the ordinary law of supply and demand, freed from the Government price limit. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	\$29.00 to \$30.00
Low phosphorus	40.00 to 42.00
No. 1 railroad wrought	34.00 to 35.00
No. 1 railroad and machinery cast	31.00 to 32.00
Iron axles	45.00
Steel axles	45.00
Carwheels	33.00 to 34.00
Railroad malleable	31.00 to 32.00
Machine shop turnings	18.00 to 18.50
Heavy axle turnings	26.00 to 27.00
Clean cast borings	19.00 to 20.00
Iron rails	37.00 to 38.00
Locomotive grate bars	20.00 to 21.00
Stove plate	22.00 to 23.00
Wrought pipe	26.00 to 27.00
No. 1 busheling scrap	26.00 to 27.00
No. 2 busheling scrap	17.00 to 18.00
Bundled sheet stamping scrap	19.00 to 20.00

New York

NEW YORK, Dec. 19.

Pig Iron.—Demand continues very active and to a large extent unsatisfied. An illustration of the difficulty with which orders are placed was furnished by an inquiry for 6000 tons of foundry iron which was quietly circulated within the last few days for delivery the first half of next year. The would-be buyer was unable to place the business and many other inquirers for smaller tonnages had similar experience. The American Locomotive Co. is in the market for 3000 tons of various grades, including low and high silicon foundry iron and basic, for delivery first quarter of 1918 at its Richmond plant. Very little Southern iron is being sold, but a few melters who are afraid they will not be able to obtain enough Northern iron to meet their requirements are buying the Southern product. The railroad situation is still unsatisfactory and the snow and cold weather have made the movement of freight trains slower than usual. It is almost impossible to obtain permits for exports. For early delivery we quote as follows:

No. 1 X.....	\$35.25
No. 2 X.....	34.25
No. 2 Plain.....	33.75
No. 2 Southern (rail and water)	\$38.75 to 39.25
No. 2 Southern (all rail)	39.15 to 39.65
No. 2 X Virginia	37.00 to 37.25

Ferroalloys.—The market for domestic ferromanganese is quiet but firm. While sales of a few small lots have been made in the last week at about \$245, it is not believed that further purchases could be made under \$250, which is now the general quotation for any delivery. One inquiry has come up for 1200 tons for second and third quarter delivery, besides one for 350 tons for first half. The spiegeleisen market is probably a little firmer, but only moderately active. One consumer is in the market for 1800 tons for delivery in the second and third quarter, while another will probably buy 2000 to 3000 tons for next year. The quotation is \$60 furnace. Imports of ferromanganese in November were probably the lowest in any month in two years—less than 1000 tons. It is also reported that domestic production is falling off rapidly due to the shutting down of numerous furnaces. Ferrosilicon, 50 per cent, is strong and active at \$150 to \$175. The fact that certain European countries are demanding 75 per cent to 90 per cent ferrosilicon for use in making hydrogen gas is seriously interfering with the regular output of the 50 per cent grade in certain localities. Ferrotungsten is quoted at \$2.40 to \$2.50 per lb. of contained tungsten, New York, with the ore concentrates selling at between \$20 to \$26 per unit in 60 per cent material, depending on the grade. Ferrovanadium ranges from \$4 to \$5, Pittsburgh, per lb. of contained vanadium for prompt delivery in small lots. Ferrocarbon-titanium, 15 to 18 per cent, is selling at 8c. per lb. in carload lots, 10c. per lb. in ton lots and 12½c. per lb. in lots less than a ton, f.o.b. Suspension Bridge, New York.

Finished Iron and Steel.—New buying is substantially negligible. Dullness is particularly true of export trade. Added to the uncertainties of securing licenses, and in particular of getting transportation on the railroads, let alone securing ship space, is the special procedure which has to be followed in the case of shipments for Allied Governments, or for a buyer in a neutral country. For the Allied Governments permits for railroad transportation have to be made through one of the foreign representatives of the Traffic Executive, so called, at 165 Broadway, New York, according to regulations made by these representatives and the export division of the general operating committee of the Eastern railroads. In the case of a shipment to a neutral country, the permit of the ship company must be obtained before railroads or mills will consider the business. A recent sale of 1500 tons of plates for use in one of the allied countries is noted at 4.75c., Pittsburgh, and a little over 300 tons for a French railroad has been offered to a mill at 5c. at the mill. Many forms of finished steel are obtainable in round lots in 60 to 90 days, but conditions

beyond the control of the mills are a decided check. Increasing quantities of material for Government use appear to be going to the mills and no concern is felt over the diminished demand for private domestic consumption. The surprising figure of 77 per cent for the rate of November fabricating business follows 61½ per cent for October, yet there are no developments in private building work. We quote mill shipments of steel bars at 3.095c., New York; shapes 3.195c., plates 3.445c. and bar iron 3.695c., New York. Out of store prices are 1c. higher and to all must be added 3 per cent of the freight charge for the transportation tax.

Old Material.—The heavy snow has multiplied the troubles of the scrap dealers and the movement of old material during the past few days has been very light. The scarcity of pig iron is reflected in high prices being paid for the various grades of cast-iron scrap. Cast-iron carwheels, particularly, are in demand and considerably higher prices have been paid. For relaying rails there is a wide range of prices, according to the quality of the rail and other considerations, and as high as \$75 per ton has been paid. The demand for heavy melting steel is fairly active and prices are somewhat higher. We quote prices of brokers as follows to New York producers and dealers, per gross ton, New York:

Heavy melting steel scrap (for shipment to eastern Pennsylvania)	\$26.00 to \$26.50
Old steel rails (short lengths) or equivalent heavy steel scrap	26.00 to 26.50
Relaying rails	60.00 to 70.00
Rerolling rails	38.00 to 39.00
Iron and steel car axles	41.00 to 42.00
No. 1 railroad wrought	32.00 to 33.00
Wrought-iron track scrap	32.00 to 33.00
No. 1 yard wrought long	32.00 to 33.00
Light iron	9.00 to 10.00
Cast borings (clean)	17.50 to 18.00
Machine-shop turnings	17.50 to 18.00
Mixed borings and turnings	14.00 to 15.00
Wrought-iron pipe (1 in. minimum diameter), not under 2 ft. long	28.00 to 28.50

Dealers in New York City and Brooklyn are quoting as follows to local foundries, per gross ton, but for delivery to cupola platforms of Brooklyn foundries about \$3 more is quoted:

No. 1 machinery cast	\$29.00 to \$30.00
No. 1 heavy cast (column, building materials, etc.)	23.00 to 24.00
No. 2 cast (radiators, cast boilers, etc.)	23.00 to 24.00
Stove plate	20.00 to 21.00
Locomotive grate bars	20.00 to 21.00
Malleable cast (railroad)	29.00 to 30.00
Old carwheels	33.00 to 35.00

Cast-Iron Pipe.—The cast-iron pipe market is almost at a standstill, due largely to the failure of Government officials to take any action in regard to prices. Nominal quotations continue at \$56.50 for 6-in. and heavier and \$59.50 for 4-in.

Cleveland

CLEVELAND, Dec. 18.

The ore shipping season has come to a close with all consumers practically sure that they will have enough ore to last them until the opening of the next season's navigation. The water shipments for the season, 62,498,901 gross tons, were 2,235,297 tons behind last year, but look large when compared with years previous to 1916 when 50,000,000 tons was not reached. The shipments for the season are considerably in excess of what had been expected until a remarkable record was made in November, this being possible because of good weather that lasted through the month. December shipments were 911,475 tons, being far ahead of any previous December except last year, when 1,085,900 tons was moved. The last ore cargoes were shipped from Escanaba Dec. 12. However, navigation was practically brought to a close three or four days earlier by the cold wave, which caused a suspension of movement of boats from Duluth, and compelled some vessels that had gone to Lake Superior ports for cargoes to lay up there for the winter. Shipments of Lake Superior ore to inland blast furnaces in November amounted to 3,562,442 gross tons, making the movement to furnaces for the season up to Dec. 1 34,779,452

tons, as compared with 35,521,229 tons for the corresponding period last year. The amount of ore on dock Dec. 1 is slightly heavier than on that date last year. Lake Erie docks held 10,023,743 tons on Dec. 1, as compared with 9,958,306 tons on Dec. 1, 1916. We quote prices as follows: Old range Bessemer, \$5.95; old range non-Bessemer, \$5.20; Mesaba Bessemer, \$5.70; Mesaba non-Bessemer, \$5.05.

Pig Iron.—There is a good demand for foundry and malleable iron for the first half, and an increased volume of inquiry for last half contracts for both grades. Furnaces are taking care of their regular trade as far as they are able to for the first half, and most producers are booking last half orders. The contracts in all cases are not subject to revision should there be a readjustment in prices. There is still a heavy unsatisfied demand for basic iron. Among Government inquiries is one for 2000 to 3000 tons of foundry and malleable iron for the Westinghouse Electric & Mfg. Co. Southern furnaces are well sold up for the first half, and several have no iron to offer for that delivery but are taking on some last half contracts. Several sales of high silicon Southern iron in lots of 500 tons and under were made during the week. Many foundries are using more scrap than usual and desire iron running 4.25 per cent and higher in silicon in their mixture. Little high silicon iron is being produced at present by Northern furnaces. There is considerable inquiry for Ohio silvery iron, which is very scarce, and furnaces are far behind on shipments. The cold weather has interfered with blast furnace operations, and this with the unimproved car situation is making it more difficult for consumers to secure iron as needed. While no foundries are reported as compelled to shut down, some have a very limited supply of iron on hand. The curtailment in the automobile production has affected some of the large malleable foundries that specialize in automobile castings, and these are now looking for Government orders to replace their automobile business. While their melt has fallen off, they expect that they will need all the iron they have purchased, and have notified producers that they wish deliveries to the full amount of their contracts. We quote, delivered Cleveland, as follows:

Bessemer	\$37.25
Basic	33.30
Northern No. 2 foundry	33.30
Southern No. 2 foundry	37.00
Gray forge	32.30
Ohio silvery, 8 per cent silicon	46.12
Standard low phosphorus, Valley furnace	50.00

Coke.—There has been no relief in the coke shortage, and some furnaces having Government work have found it necessary to appeal to the fuel administrator to secure small lots for prompt shipment. Brokers have been able for the most part to cover their regular trade with foundry coke contracts, and are receiving numerous inquiries from other sources, but are unable to secure any additional coke to sell.

Finished Iron and Steel.—The demand for steel for Government requirements continues heavy, and consumers are pressing the mills for deliveries on steel for Government work. While there have been a number of suspensions of contracts and some cancellations in the automobile field, a renewal of activity in this field is shown by the placing of specifications for round lot shipments wanted during January by one of the largest automobile manufacturers. There is a large volume of inquiry for semi-finished steel, particularly for sheet bars, but the supply is insufficient to meet the demands. One consumer, who was asking for 2500 tons of sheet bars a month, offered to take any quantity at any time, and a Cleveland mill took the order on that basis. The demand for structural material has improved. This has been very light for some time because of the high prices, and at least one mill is able to take orders for structural shapes for prompt shipments. The George A. Fuller Co. has given the Bethlehem Steel Co. an order for 4000 tons of steel for the new ordnance works of the Morgan Engineering Co., Alliance, and the building program of this company calls for additional structures requiring 3000 tons more. The Navy Department has placed a 350-ton hammer head crane with the McMyler Interstate Co.,

Bedford, Ohio. This will require 2500 tons of steel. The Government received bids for three of these cranes, but it is understood that the other two will not be placed at present. The John Gill & Sons Co., Cleveland, general contractor, will place contracts shortly for 2500 tons of steel for the Philadelphia Public Library building. The Republic Structural Iron Works Co. was low bidder for 900 tons for an addition to the municipal light plant in Cleveland. Among inquiries pending is one for 1900 tons of structural material for work for the Brier Hill Steel Co. and another for 1500 tons for a municipal bridge in Columbus, Ohio. There is a good demand for steel rails for early shipment, and several small lot sales are reported at \$70 to \$75. The demand for steel bars for early shipment is active. The demand for plates has quieted down somewhat, and these are now quoted at 4c. to 4.25c. by a local mill that is making sales at higher than the Government price. To replace the wrecking tug Favorite, taken over by the Government, the Great Lake Towing Co., Cleveland, will build a large tug, 200 tons of steel for which will be furnished by several mills. Makers of hard steel bars have reduced prices from 3.25c. to 3c. at mill, which is now being generally quoted. As no extra is charged for twisting, the price of these bars for reinforcing purposes has been brought down to the same basis as soft steel bars without Government regulation. The demand for black and blue annealed sheets continues heavy, and some of the mills are entirely sold up for the first quarter. Galvanized sheets are moving rather slowly. We quote warehouse prices as follows: Steel bars, 4.03½c.; plates, 4.38½c.; structural material, 4.13½c.; No. 10 blue annealed sheets, 5.35c.; No. 28 black sheets, 6.35c.; No. 28 galvanized sheets, 7.60c.

Old Material.—The condition of the scrap market has become very unsatisfactory from the standpoint of the dealer. Owing to the regulation of prices, dealers claim that they cannot do business at a profit on heavy melting steel, borings and turnings. Producers are unwilling to sell heavy melting steel under \$30, the Government price, and mills will not pay more than that. As a result, many dealers are making no efforts to do business in the Government regulated grades. Some of the mills would buy steel scrap, but there is no inducement to the dealers to make sales at the Government price, unless they can buy at lower prices. There are some reports, not confirmed, that dealers have paid higher than the Government price for heavy melting steel to cover on high priced short sales. While not active, the market is very firm, and prices on several grades are higher. There is a good demand from steel foundries for low phosphorus melting scrap, sales of which are being made from \$38 to \$39. Dealers quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	\$26.00 to \$27.00
Steel rails, rerolling	36.00 to 37.00
Steel rails, under 3 ft.	34.50 to 35.50
Iron rails	35.00 to 36.00
Steel car axles	45.00 to 46.00
Heavy melting steel	29.00 to 30.00
Cast borings	18.00 to 18.40
Iron and steel turnings and drillings	18.25 to 18.75
No. 1 railroad wrought	34.00 to 35.00
Hydraulic compressed steel scrap	24.50 to 25.50
Carwheels	26.50 to 27.50
Relaying rails, 50 lb. and over	50.00 to 60.00
Agricultural malleable	22.00 to 23.00
Railroad malleable	28.00 to 29.00
Steel axle turnings	23.00 to 24.00
Light bundled sheet scrap	20.00 to 20.50

Per Net Ton	
Iron car axles	\$44.00 to \$45.00
No. 1 busheling	24.00 to 25.00
No. 1 cast	24.00 to 25.00
Railroad grate bars	18.00 to 18.50
Stove plate	18.00 to 18.50

Bolts, Nuts and Rivets.—There is a heavy demand for bolts and nuts for Government work and for the Allies. Among inquiries pending is one from the Quartermaster's department of the Army for 35,000,000 bolts. A heavy volume of rivet orders is coming out for shipyards. The Emergency Fleet Corporation has placed 7500 tons of rivets for an Eastern shipyard, and two other orders from the East, aggregating 6000 to 8000 tons, are pending. Several other inquiries have come from the United States Shipping Board. We quote rivets at 4.65c., Pittsburgh, for structural and 4.75c. for boiler rivets.

Cincinnati

CINCINNATI, Dec. 18—(By Wire).

Pig Iron.—The outstanding feature is the heavy buying of southern basic iron by nearby melters. One contract involves 10,000 tons while another is under negotiation calling for about double that tonnage. This iron is for first half shipment and it is rumored that the recent bookings made by an Alabama furnace have about exhausted its first half supply. Foundry iron sales are confined to off iron that different producing interests can offer. Very little can be had that is not high in sulphur and even this off iron is taken without delay by melters who have to fill in on their first half requirements. A little high silicon iron in the south was offered this week, but the furnace interests having this for sale cannot take on much future business. The foundries are more anxious than heretofore to contract for a last half supply, believing that the present base price of \$33 will probably be increased instead of reduced. Selling agencies are not urging purchasers to buy for the delivery named and it is probable that some important transactions may be postponed until after the holidays. Based on freight rate of \$2.90, Birmingham, and \$1.26 from Ironton, we quote f.o.b. Cincinnati as follows:

Southern coke, No. 2 foundry and 2 soft	....	\$35.90
Southern Ohio coke, No. 2	....	34.26
Basic, Northern	....	34.26

Coke.—The situation continues to grow worse and shipments that producers are able to start forward are subject to almost indefinite delays. Connellsville and Wise County operators are the only ones that are now taking on any new business, with the exception of some by-product coke that is available, but the amount is exceedingly limited. The nearby foundries are running very close to shore on a supply and unless shipments are moved more promptly within the next few days a few of them will be compelled to close down.

Finished Material.—The local warehouses have now decided to take full advantage of the 18½c. freight rate from Pittsburgh to Cincinnati, although heretofore they only added 18c. so as to make even figures. The following are jobbers' quotations: Iron and steel bars, 4.08½c. Twisted bars are as follows: $\frac{3}{4}$ x 1¼-in., 4.23½c.; $\frac{5}{8}$ -in., 4.33½c.; $\frac{1}{2}$ -in., 4.43½c.; $\frac{3}{8}$ -in., 4.63½c., and $\frac{1}{4}$ -in., 4.88½c. Structural shapes are 4.18½c.; plates, $\frac{1}{4}$ -in. and heavier, 4.43½c.; No. 10 blue annealed sheets, 5.43½c. Cold rolled shafting 10 per cent discount from list. Business is curtailed as few shipments could be made to out-of-town customers on account of the railroad congestion. Local building operations are also temporarily suspended. The warehouse price of wire nails is \$4.10 per keg base. The mill quotation on No. 28 black sheets is 5.18½c. and No. 28 galvanized sheets, 6.43½c., f.o.b. cars Cincinnati or Newport, Ky.

Old Material.—Dealers state that there is a good demand for wrought scrap from the rolling mills, but they are still very much handicapped in getting shipments forward. For the past week it was almost impossible to ship anything to the Pittsburgh district, and milder weather has relieved the situation only to a slight extent. Priority orders are of course necessary and these cause considerable delay. The following are dealers' prices, f.o.b. cars, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	....	\$17.50 to \$18.00
Old iron rails	....	32.00 to 32.50
Relying rails, 50 lb. and up	....	44.00 to 44.50
Rerolling steel rails	....	33.00 to 33.50
Heavy melting steel scrap	....	25.50 to 26.00
Steel rails for melting	....	24.50 to 25.00
Old carwheels	....	27.00 to 27.50

Per Net Ton

No. 1 railroad wrought	....	\$29.00 to \$29.50
Cast borings	....	13.00 to 13.50
Steel turnings	....	13.00 to 13.50
Railroad cast	....	18.50 to 19.00
No. 1 machinery cast	....	25.00 to 25.50
Burnt scrap	....	14.00 to 14.50
Iron axles	....	40.00 to 40.50
Locomotive tires (smooth inside)	....	33.50 to 34.00
Pipes and flues	....	15.00 to 15.50
Malleable cast	....	19.50 to 20.00
Railroad tank and sheet	....	14.50 to 15.00

Powdered Coal for Malleable Iron Melting

POWDERED coal as a fuel for melting malleable iron is being used only experimentally but should prove adaptable to this service according to views brought out in a paper presented by Joseph Harrington, Chicago, before the American Foundrymen's Association at its annual meeting in Boston, Sept. 25. He said that he knows of but one instance of malleable iron melted with powdered coal on a commercial scale and this, though brief, indicated that had the work been continued economical operation would have been effected.

Sustained high temperatures which he attaches to the use of powdered coal leads him to believe that this form of fuel will reduce the time required for heating the charge to the melting point and for melting it after that point is reached. This he held advantageous, contending that during the heating period combustion is least complete and the loss of fuel greatest and that in the melting period loss of valuable ingredients in the iron is most likely to take place, so that increased rapidity in both events leads to economy.

After all of the iron is liquified and covered with slag it is, he explained, protected from the effects of furnace gases, and the presence of more or less oxygen has no appreciable effect on it, so that excess air can be proportioned to produce high temperatures. He believes that with powdered coal these may exceed 3000 deg. In this connection he said that the flame, using powdered coal, can be controlled so that complete combustion will take place within 5 or 6 ft. of the burner even when it is delivering 500 or 600 lb. of coal per hour. The point of most intense temperature, he added, is about at the end of the flame, and a pile of iron should liquify promptly, as the flame temperature is perhaps as high as 3500 to 4000 deg.

Effect on Furnace Lining

Regarding the effect that the flame of powdered coal may have on the brick of the furnace lining, he contended that this should be no greater than with ordinary methods, as the powdered coal jet does not impinge directly on brick work. Good brick, he believes, should withstand a temperature of 2800 deg. indefinitely and 3000 deg. for moderate periods, and he doubts that these temperatures are frequently reached in malleable furnaces.

Flexing effect, he held, is more serious, but he feels that this can be kept under control. The chemical analysis of furnace slag, he said, does not differ in quality from the analysis of coal ash and the addition of melted coal ash to the bath does not alter anything except the range of its chemical constituents. Should the coal ash bring one element greatly in excess of the others, he suggests that it would be possible to introduce materials to counteract this.

All the evidence which he has been able to obtain from his experience with this fuel in malleable service indicates, he said, that there was an actual diminution in the burning out of carbon to the extent of 2 to 5 per cent, rendering it necessary to decrease the amount of new pig in the charge to that extent in order that the character of the iron be the same.

The Minster Machine Co., Minster, Ohio, is making additions to its plant that will be 30 x 200 ft. and 72 x 150 ft., both one story and of brick and steel construction. Nearly all equipment has been purchased but the company is in the market for an 8 or 10-ton electric crane, floor operated.

The Greaves-Klusman Tool Co., Cincinnati, builder of engine and automatic lathes, has purchased the plant and equipment of the Champion Tool Works, Cincinnati, and will use the property as an erecting plant in addition to its own present works.

The Wharton Steel Co., Wharton, N. J., has again placed its No. 1 blast furnace in operation, following the recent fire which destroyed a section of the works. The rebuilding and repairs were accomplished in 14 days.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight rates from Pittsburgh on iron and steel articles, aside from wrought iron and steel pipe in carloads, per 100 lb., New York, 19.5c.; Philadelphia, 18.5c.; Boston, 21.5c.; Buffalo, 11.6c.; Cleveland, 13.5c.; Cincinnati, 18.5c.; Indianapolis, 20c.; Chicago, 21.5c.; St. Louis, 27c.; Kansas City, 47c.; minimum carload, 36,000 lb.; St. Paul, 35.5c.; minimum carload, 36,000 lb.; Denver, 79c.; minimum carload, 36,000 lb.; Omaha, 47c.; minimum carload, 36,000 lb.; New Orleans, 30.7c.; Birmingham, 46c.; Pacific Coast, 75c.; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is 90c.; minimum carload, 40,000 lb. and 85c.; minimum carload, 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 40c. per 100 lb., minimum carload 46,000 lb.; to Omaha 40c., minimum carload 46,000 lb., to St. Paul 35.5c., minimum carload 46,000 lb.; Denver 79c., minimum carload 46,000 lb. *A 3 per cent transportation tax now applies.*

Structural Material

I-beam, 3 to 15 in.; channels, 3 to 15 in. angles, 3 to 6 in. on one or both legs. $\frac{1}{4}$ in. thick and over, and zees 3 in. and over, 3c.

Wire Products

Wire nails, \$3.50 base per keg; galvanized, 1-in. and longer, including large-head barb roofing nails, taking an advance over this price of \$2, and shorter than 1-in., \$2.50. Bright basic wire, \$3.35 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.25; galvanized wire, \$3.95; galvanized barb wire, and fence staples, \$4.35; painted barb wire, \$3.65; polished fence staples, \$3.65; cement-coated nails, \$3.40 base; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 47 per cent off list for carload lots, 46 per cent for 1000-rod lots, and 45 per cent off for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large rivets	\$4.65 base
1 1/2 in. x 6 in. smaller and shorter rivets	.45-10 per cent off list
Machine bolts h.p. nuts, $\frac{1}{4}$ in. x 4 in.	
Smaller and shorter, rolled threads	.50-10 per cent off list
Cut threads	.50-5 per cent off list
Larger and longer sizes	.40-10 per cent off list
Machine bolts, c.p.c. and t. nuts, $\frac{1}{4}$ in. x 4 in.	
Smaller and shorter	.40-10 per cent off list
Larger and longer	.35-5 per cent off list
Carriage bolts, $\frac{1}{4}$ in. x 5 in.	
Smaller and shorter, rolled threads	.50-5 per cent off list
Cut threads	.40-10-5 per cent off list
Larger and longer sizes	.40 per cent off list
Lag bolts	.50-10 per cent off list
Plow bolts, Nos. 1, 2, 3	.50 per cent off list
Hot pressed nuts, sq. blank	.25c. per lb. off list
Hot pressed nuts, hex. blank	.23c. per lb. off list
Hot pressed nuts, sq., tapped	.23c. per lb. off list
Hot pressed nuts, hex., tapped	.21c. per lb. off list
C.p.c. and t. sq. and hex. nuts, blank	.225c. per lb. off list
C.p.c. and t. sq. and hex. nuts, tapped	.20c. per lb. off list
Semi-finished hex. nuts	
% in. and larger	.60-10-10 per cent off list
9/16 in. and smaller	.70.5 per cent off list
Stove bolts	.70-10 per cent off list
Stove bolts	.2 1/2 per cent extra for bulk
Tire bolts	.50-10-5 per cent off list

The above discounts are from present lists now in effect. All prices carry standard extras.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$57; chain rods, \$65; screw, rivet and bolt rods and other rods of that character, \$65. A tentative differential of \$10 per ton over soft rods for high carbon rods has been agreed upon.

Railroad Spikes and Track Bolts

Railroad spikes 9/16 in. and larger, \$5 to \$5.50; $\frac{1}{4}$ in. 7/16 in. and $\frac{1}{2}$ in., \$7, base. Boat spikes, \$5.25 per 100 lb. f.o.b. Pittsburgh. Track bolts with square nuts, 7c. to 7.50c. to railroads, and 8c. to 8.50c. in small lots for fairly prompt shipment.

Terne Plate

Effective Nov. 7, prices on all sizes of terne plates are as follows: 8-lb. coating, 200 lb., \$15 per package; 8-lb. coating, I. C., \$15.30; 12-lb. coating, I. C., \$16.75; 15-lb. coating, I. C., \$17.75; 20-lb. coating, I. C., \$19; 25-lb. coating, I. C., \$20; 30-lb. coating, I. C., \$21; 35-lb. coating, I. C., \$22; 40-lb. coating, I. C., \$23 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.90c. for delivery late this year, and 4.50c. to 5c. from warehouse in small lots for prompt shipment. Refined iron bars, 3.50c. in carload and larger lots, f.o.b. mill.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card, as announced Nov. 5 by the Government on steel pipe, those on iron pipe being the same as quoted for some time:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
$\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$	44	17 1/2	$\frac{1}{8}$ and $\frac{1}{4}$	23	+4
$\frac{1}{2}$	48	33 1/2	$\frac{1}{8}$	24	+3
$\frac{3}{4}$ to 3	51	37 1/2	$\frac{1}{2}$	28	10
			$\frac{1}{2}$ to 1 1/2	33	17

Lap Weld

2	44	31 1/2	$\frac{1}{4}$	18	3
$\frac{1}{2}$ to 6	47	34 1/2	$\frac{1}{2}$	25	11
7 to 12	44	30 1/2	$\frac{1}{2}$	26	12
13 and 14	34 1/2		$\frac{1}{2}$ to 6	28	15
15	32		7 to 12	25	12

Butt Weld, extra strong, plain ends

$\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$	40	22 1/2	$\frac{1}{4}$ and $\frac{3}{4}$	22	5
$\frac{1}{2}$	45	32 1/2	$\frac{1}{2}$	27	14
$\frac{3}{4}$ to 1 1/2	49	36 1/2	$\frac{3}{4}$ to 1 1/2	33	18
2 to 3	50	37 1/2			

Lap Weld, extra strong, plain ends

2	42	30 1/2	$\frac{1}{4}$	19	4
$\frac{1}{2}$ to 4	45	33 1/2	$\frac{1}{2}$	25	11
$\frac{3}{4}$ to 6	44	32 1/2	$\frac{1}{2}$	27	14
7 to 8	40	26 1/2	$\frac{1}{2}$ to 4	29	17
9 to 12	35	21 1/2	$\frac{1}{2}$ to 6	28	16

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Metal Markets

The Week's Prices

Cents per pound for early delivery							
New York		Tin		Lead		Spelter	
Copper,	Electro-	New	New	St.	New	St.	St.
Dec.	Lake	Lytic	York	York	Louis	York	Louis
12.	23.50	23.50	85.50*	6.50	6.37 1/2	7.75	7.50
13.	23.50	23.50	85.50*	6.45	6.30	7.75	7.50
14.	23.50	23.50	85.50*	6.40	6.25	7.75	7.50
15.	23.50	23.50	85.50*	6.40	6.25	7.75	7.50
17.	23.50	23.50	85.50*	6.40	6.25	7.75	7.50
18.	23.50	23.50	85.50*	6.40	6.25	7.75	7.50

*Nominal.

NEW YORK, Dec. 19.

The markets are all extremely dull. The copper situation is without feature at the controlled prices. Tin is nominal and scarce. Lead is slightly easier. Spelter is unchanged and in poor demand. Antimony is lifeless.

New York

Copper.—Official information is hard to obtain but it seems certain that there will be no change in the Government price of 23.50c. in the wholesale market and 24.67 1/2c. in the jobbing market for at least the first quarter. These prices are the market levels at which considerable business has been done for prompt and December delivery and for the first quarter, including orders outside of Government work. It is estimated that war needs are not requiring any more than 75 per cent of the total production. Satisfaction in the trade seems to be general as to the manner in which supplies are being regulated.

Tin.—The movement reported last week as on foot to put aside all import restrictions regarding tin has failed. The obtaining of licenses became necessary on Dec. 12 and there has been considerable confusion since. The delays attending the securing of such licenses have been such that docks are burdened with metal as custom houses cannot accept tin until licenses are in the hands of importers. This involves additional expense to importers. There has been no delay in the obtaining of guarantees as to consumers through the American Iron and Steel Institute. The entire market has been extremely quiet the past week. The selling of Banca tin to needy users by a large consumer, referred to last week, has proceeded on a small scale since. There have been inquiries for prompt shipment from England with but little metal available. The market for spot Straits is nominal at 85c. to 86c., New York, with practically none offered in this market. Arrivals to date have been 1015 tons, with 4400 tons reported afloat. The London market is again higher at £305 per ton, or £6 higher than a week ago.

Lead.—The announcement is made that there will be no fixing of a price for lead for the present at least. This is taken to mean that there is sufficient lead to meet all needs and that price-fixing is unnecessary. The decision comes as a surprise because it is contrary to what was generally expected. The Government's purchases are probably to be regulated as in the recent past according to the quotations of a leading trade paper. In the last week domestic business has been very light, with the tone of the market easy. There has been an improvement in inquiry for export. Prices have eased off slightly until yesterday lead was quoted at 6.40c., New York, or 6.25c., St. Louis, for early delivery. The leading interest, continues to quote 6.25c., New York. During the week it is understood that there has been further negotiations with the Government as to additional supplies.

Spelter.—The market continues featureless and very dull. There has been some buying by galvanizers recently but general demand is at a low ebb. It is stated that many producers are operating at a loss at present prices which are 7.50c., St. Louis, or 7.75c., New York, for prime Western for early delivery. Production is gradually diminishing, due to the shutting down of certain smelters, but even at that the supply is still

more than equal to the demand. The only factor that keeps the price from going lower is that of cost. Railroad congestion between here and St. Louis is also interfering seriously with the execution of contracts. The Government will receive bids on Friday, Dec. 21, on 1000 tons of grade C spelter which is only a little better than prime Western. The details, if obtainable, are expected to be interesting. Because of the official decision just reached not to fix any price on lead at present, it is not expected that anything will be done toward regulating spelter prices.

Antimony.—Demand has not increased and the market has again become dull with the grades available a little lower at 15c. per lb., New York, duty paid, for early delivery.

Aluminum.—In a dull market No. 1 virgin metal, 98 to 99 per cent pure, is unchanged at 36c. to 38c. per lb., New York, for early delivery.

Old Metals.—The market is very dull. Dealers' selling prices are nominally as follows:

	Cents per lb.
Copper, heavy and crucible (nominal)	23.50
Copper, heavy and wire (nominal)	23.50
Copper, light and bottoms	21.00 to 21.50
Brass, heavy	17.00 to 17.25
Brass, light	12.00 to 12.25
Heavy machine composition	23.75 to 24.25
No. 1 yellow rod brass turnings	14.25 to 14.50
No. 1 red brass or composition turnings	19.00 to 19.50
Lead, heavy	5.75
Lead, tea	4.50
Zinc	5.75

Chicago

DEC. 18 (By Wire).—There is considerable call for casting copper from foundries having Government orders. Tin is moving in small lots only. Lead has been fairly active. All the other metals are weak and dull. We quote copper in part carloads at 24.62c.; tin, 88c. to 95c.; lead, 6.50c. to 6.62 1/2c.; spelter, 7.50c. to 7.62 1/2c. Old lead pipe is quoted at 4.90c., tinfoil at 50c. and block tin at 55c., all in less than carload lots.

Imports of Ferroalloys and Their Ores to Be Controlled

The importation of the various ferroalloys and their ores, including chrome ore, cobalt, ferromanganese, manganese ore, molybdenum ore, titanium ore, tungsten ore and vanadium ore, is to come under the regulation of the War Trade Board. At a meeting in New York on Monday, Dec. 17, of nearly all the importers of these metals and minerals, at which was present Frederick B. Peterson, director of the Bureau of Imports of the War Trade Board, it was decided that the regulation of such imports would be placed in the control of the American Iron and Steel Institute, the arrangement being similar to that now in effect regarding tin imports and distribution. Details have not yet been worked out, but the object of the new plan is chiefly to secure co-operation in obtaining import licenses and thus facilitate the importation of these commodities.

The regular monthly meeting of the Pittsburgh Foundrymen's Association was held in the Fort Pitt Hotel, Pittsburgh, Monday evening, Dec. 17. There was a Christmas dinner, followed by a vaudeville entertainment. W. S. Diggs, chairman of the Pittsburgh 4-minute men, made a very stirring address on the subject of "Co-operation." A collection was taken amounting to \$2,425.50 to aid the Permanent Blind Relief War Fund for Soldiers and Sailors.

The Great Northern Railway has awarded a contract to A. Guthrie & Co., Inc., 366 Jackson Street, St. Paul, Minn., for improvements costing about \$1,000,000 in its ore docks at Allouez Bay, Superior, Wis.

The Reading Iron Co., Reading, Pa., has completed the relining and other improvements at its Keystone blast furnace, and plans to place the stack in operation about Jan. 1.

IRON AND INDUSTRIAL STOCKS

Market Shows No Strength—Government Advances Funds to Finance Bethlehem Munition Contracts

The general decline in the stock market continues and some industrial stocks touched lower values than they reached in the panic ten years ago. No market is available for securities, such as Great Britain found here in her period of financial adjustment to a war basis. Bond prices also have moved to lower levels.

Announcement has been made from Washington that \$2,000,000 will be advanced the Bethlehem Steel Corporation on munition contracts to eliminate delay in securing necessary increased working capital from private sources. This action is considered timely. From now on it will doubtless be more generally a war policy, and its value in expediting war contracts and preventing a further tightening of an already depleted money market cannot be overestimated.

The range of prices on active iron and industrial stocks from Tuesday of last week to Wednesday of this week was as follows:

Allis Chalm. com. 15 1/4 - 16	Int. Har. Corp.
Allis Chalmers pf. 65 - 70	com. 51 - 52
Am. Can. com. 30 1/2 - 35 1/8	Lackaw. Steel 71 1/4 - 79
Am. Can. pf. 88 - 90	Lake Super. Corp. 10 1/2 - 11
Am. Car. & Fdry. com. 60 1/2 - 64	Midvale Steel 40 1/2 - 42
Am. Loco. com. 46 7/8 - 50 1/2	Nat.-Acme 26 - 26 3/4
Am. Loco. pf. 94	Nat. En. & Stm. 32 - 34 3/8
Am. Radi. com. 255	N. Y. Air Brake. 99 - 109
Am. Ship com. 90 - 91 1/2	Nova Scotia Steel 60 - 61
Am. Steel Fdries 50 1/2 - 53	Press. Steel com. 49 - 50 1/2
Bald. Loco. com. 50 1/2 - 54	Press. Steel pf. 93 - 95
Bald. Loco. pf. 98	Ry. Steel Spring com. 39 1/2 - 40 1/2
Beth. Steel com. 66 3/4 - 72 7/8	Ry. Steel Spring pf. 95 3/4
Beth. St. Cl. B. 66 3/4 - 73 1/2	Republic com. 69 1/2 - 73
Beth. Steel pf. 85	Republic pf. 92
Can. Car. & Fdry. com. 15	Sloss com. 34 - 35
Can. Car. & Fdry. pf. 42	Superior Steel 32 - 34
Cent. Fdry. com. 26 1/4 - 28	Superior Steel 1st pf. 96
Cent. Fdry. pf. 38 - 40	Un. Alloy Steel. 35 - 36
Chic. Pneu. Tool. 39 1/2 - 41	U. S. Pipe com. 10 1/2 - 11
Colo. Fuel. 30 - 32 1/2	U. S. Pipe pf. 44
Cruc. Steel com. 46 7/8 - 51	U. S. Steel com. 79 1/2 - 85 5/8
Cruc. Steel pf. 86 - 87 1/2	U. S. Steel pf. 102 1/2 - 106 3/4
Deere & Co. pf. 91 1/2 - 95	Va. I. C. & Coke. 48 - 50
Gen. Electric. 118 - 123 1/2	Warwick 8 - 8 1/2
Gt. No. Ore. Ct. 23 3/4 - 24 3/4	Westingh. Elec. 33 3/4 - 36 3/4
Gulf States Steel. 83 - 84	
Int. Har. of N. J. com. 103 1/4 - 107 1/2	

Wheel Company's Progress

The Sewell Cushion Wheel Co., Detroit, held a convention of its branch managers recently in the general offices of the new factory, which was completed last year. H. J. Sewell, president of the company, called attention to the fact that the first set of Sewell wheels was manufactured back in 1908. In 1909 the gross sales amounted to less than \$1,000; 1910, \$3,000; 1911, \$11,000; 1912, \$28,000; 1913, \$72,000; 1914, \$120,000; 1915, \$198,000; 1916, \$310,000, and the sales for 1917 will run over three-quarters of \$1,000,000. Sewell wheels have been adopted and endorsed by some of the largest operators of trucks in the country, including the American Radiator Co., Bethlehem Steel Co., Chicago Telephone Co., Crane Co., Library Bureau, Liquid Carbonic Co. and Standard Oil Co. A banquet was given at the Detroit Athletic Club, and in addition to the branch managers, it was attended by H. J. Sewell, president; J. H. Hammes, vice-president; W. T. Sewell, treasurer; Ralph S. Moore, secretary; Arnold B. Cooper, director; Chas. Rider, director; Geo. L. Allen, factory manager; Fred B. Boylan, sales manager; James C. Sallee, advertising manager, and C. H. Shaw, credit manager.

Harbison-Walker Refractories Company's Annual Report

The fifteenth annual report for the year ended Sept. 30, 1917, of the Harbison-Walker Refractories Co., Farmers Bank Building, Pittsburgh, was sent to stockholders last week. President H. W. Croft in his report to the stockholders says in part:

"The abnormal conditions of business referred to in

our letter of last year have not only carried through the present year, but in addition, our plants have operated at a largely increased capacity. The earnings as shown are after estimated income and excess war taxes have been deducted, and your officers feel under all the circumstances the showing made is satisfactory."

The balance sheet follows:

Assets	
Property account	\$28,142,802.00
Betterments, completed	2,075,071.78
Betterments, uncompleted	1,008,392.24
Deferred charges to future operations	546,005.78
(Includes clay and ganister outlays (\$320,016.95), advanced royalties, stripping, prospecting, uncompleted extraordinary repairs, etc.)	
Current assets:	
Inventories	\$1,586,882.51
Accounts receivable	3,746,817.41
Bills receivable	4,095.83
Cash	2,575,919.32
	7,913,715.07
Investment securities:	
Investments of reserves	1,925,806.42
Other securities	788,322.62
	2,714,129.04
Total assets	\$42,400,115.91
Liabilities	
Capital stock:	
Preferred (6 per cent cumulative)	\$9,600,000.00
Common	18,000,000.00
	\$27,600,000.00
Reserves:	
Clay, coal and ganister properties depletion fund	\$251,275.00
Sundry reserves	3,299,649.36
	3,550,924.36
Current liabilities:	
Accounts payable	\$983,339.51
Pay rolls	248,776.81
	1,232,116.32
Surplus	10,017,075.23
Total liabilities	\$42,400,115.91

The annual meeting of stockholders of the company will be held in its general offices, Pittsburgh, Jan. 21, 1918.

Will Be Consolidated

Announcement has been made that the Pusey & Jones Shipbuilding Co., Wilmington, Del., and the Pennsylvania Shipbuilding Co. and the New Jersey Shipbuilding Co., both located at Gloucester, N. J., are to be consolidated. The new company will have \$10,000,000 8 per cent cumulative preferred stock and the same amount of common stock. The three plants will continue operations. It is stated that the consolidation has been planned for the purpose of speeding up work for the Government.

Christoffer Hannevig, majority owner of all three concerns, will be the president. Associated with him will be Finn Hannevig, vice-president; Henry Lysholm, vice-president and general manager of the shipbuilding plants; H. E. Norbom, vice-president, treasurer and managing director; C. Stewart Lee, assistant managing director, and R. N. Bulowa, secretary.

Dividends

The American Brake Shoe & Foundry Co., quarterly, 1 1/2 per cent on the common, 2 per cent and extra 2 per cent on the preferred, all payable Dec. 31.

The Canadian Locomotive Co., quarterly, 1 1/2 per cent on the common and 1 1/4 per cent on the preferred, payable Jan. 1.

The Empire Steel & Iron Co., 3 per cent and extra 5 per cent on account of accumulated dividends on the preferred, payable Jan. 2.

The Sloss-Sheffield Steel & Iron Co., 1 1/4 per cent on the preferred, payable Jan. 2.

The Standard Screw Co., quarterly, 6 per cent on the common and 3 per cent on the preferred A, payable Jan. 1.

The United Shoe Machinery Co., quarterly, 50c. on the common and 37 1/2c. on the preferred, payable Jan. 5.

The Wheeling Steel & Iron Co., quarterly, 2 per cent and extra 2 per cent, payable Dec. 21.

To meet requirements of railroads for data upon which to fix priority of shipments, Joseph T. Ryerson & Son, Inc., Chicago, has adopted a questionnaire which is sent to all its customers along with its invoices, asking them to classify the material ordered, as (1) required on orders received direct from the Government, (2) for work required by the Government but not ordered by it direct, (3) required for use in manufacture of articles not included in two preceding classes.

Piez General Manager of Shipbuilding

Latest Reorganization of Shipping Board Results in Business Man Being Given Much More Power—Chairman Hurley Optimistic as Admiral Harris Retires

WASHINGTON, Dec. 18.—A sweeping investigation of the United States Shipping Board and Emergency Fleet Corporation was ordered by the Senate to-day as the result of the latest upheaval in that dual organization, following which Admiral Harris, general manager of the corporation, has tendered his resignation and Charles A. Piez, vice-president of the corporation, has been chosen to succeed him. The patience of Congress has been exhausted by the numerous squabbles that have occurred in the shipping board and that have prevented anything like a satisfactory speeding up of the shipbuilding program. The investigation ordered to-day will be made by the Senate Committee on Commerce and will be outlined at a preliminary meeting to be held this week. The resolution directs the committee to investigate the "plans and progress and all matters in connection with the building of merchant ships" by the shipping board and fleet corporation with a view to making remedial recommendations to Congress.

The latest revolution in the shipping board finally severs the relation between that organization and the Navy Department. When Admiral Capps retired, partly because of failing health, but also because of friction with other officials of the shipping board and the fleet corporation, Chairman Hurley suggested to the President that another naval officer be detailed to fill the vacancy. This action, it is now said, was taken for diplomatic reasons, and it is intimated that Mr. Hurley was even then convinced that an experienced business man must take hold of the fleet corporation in order that real progress might be made with the building of the big emergency fleet, the contracts for which now call for more than 8,000,000 tons dead-weight.

The Admiral's Resignation

Admiral Harris' resignation was announced here this morning in newspaper publications evidently inspired by his friends. It was represented in these statements that he had "found it impossible to build ships because of the hesitation and vacillation of his superiors," and that although he entered upon his task with great enthusiasm, there have been "innumerable meetings of committees, interminable consideration and discussion, but no action." It was also said that Admiral Harris was held in check by red tape and that his "dynamic energy" was hampered by the "system of dual authority" by which the operations of the board and fleet corporation have been governed. It was added that "the resignation of Mr. Hurley as chairman would not be unexpected."

For the purpose of presenting the other side of the case and in his own defense Chairman Hurley to-day made a formal statement in which he gives his version of Admiral Harris' difficulties and declares that under the board and fleet corporation as now reorganized all the expectations of the Administration and of the public as to the rapid building of ships will be fully realized. Mr. Hurley's statement is as follows:

Chairman Hurley's Statement

"The Emergency Fleet Corporation was organized in the same form as other large and successful corporations. The chairman of the shipping board is the president of the fleet corporation, and there are two vice-presidents, Mr. Donald of the board and Mr. Piez, elected several weeks ago. There is a board of trustees which corresponds to the usual board of directors, and of which the president, vice-president and members of the shipping board are members. The organization is precisely the same as that of the usual corporation.

"In order to expedite the actual production of ships, the ground work of plans having been laid by previous

managements, Mr. Piez, one of the most noted engineers and organizers in the country, was requested by me to effect a reorganization. This reorganization is nearly completed. Its success is assured by the fact that it derives its inspiration from the actual conditions in the shipyards of the country. Mr. Piez was head of our production committee which investigated conditions in the shipyards, spending considerable time in many of the representative plants.

"Admiral Harris, upon the retirement of Admiral Capps on Dec. 1, on account of ill health, was designated general manager. While the reorganization was in progress he suggested to me that the Emergency Fleet Corporation be moved to Philadelphia. I suggested that a matter of this kind, involving policy as well as possible legislative approval, would certainly have to be submitted to the board of trustees, as it would be submitted in any corporation to the board of directors. He also wanted to give his immediate approval to an expenditure of \$12,000,000 for housing operations in connection with the shipyards. This being a departure from the corporation's function of shipbuilding, I felt that the trustees should pass upon it. Admiral Harris then expressed the opinion that his authority was to be limited and he would be able to render more service elsewhere. The board of trustees concurred in this judgment, feeling that their duty required careful consideration of projects apart from shipbuilding.

Tribute to Piez

"Mr. Piez' grasp upon the whole shipbuilding program has been so strong, and his knowledge of actual conditions in the yards so definite as a result of his study in the field, that the best results can be obtained by combining his functions as vice-president with those of general manager. He has been designated as general manager. Former Rear Admiral Bowles, whose practical shipbuilding experience was gained as president of the Fore River Shipbuilding Co., and who has for a long time been in actual charge of construction plans, is to be assigned an important part in the direction of affairs. James Heyworth has been placed in charge of wooden ship construction and Charles Day, another prominent engineer and production expert, is to be manager of the production department.

"Underlying the reorganization which has been completed was the desire to bring the fleet corporation closer to the shipyards. Mr. Day, for instance, served with Mr. Piez in the personal visits of the production committee to the shipyards, where actual construction conditions were ascertained. Mr. Day then went to England where he made an exhaustive investigation into the methods which prevail in the shipyards there. He has now returned and becomes one of the important factors in our speeding-up program.

Pleasing Prospect

"The result of the reorganization already is apparent in all the yards. Lloyd's has just made a report which has been carefully checked up and which shows that there is a better basis for optimism than there has been at any time since the emergency program was launched. The conditions on the Pacific Coast have so improved that records are being broken in the speed with which ships are being turned out. Admiral Bowles' reports show that construction work is progressing as fast as human labor can turn it out. The plans of last May have been translated into hulls on the shipways and ships on the seas. We are close to the point where the results of what has been done will be apparent to everyone. Admiral Bowles' carefully checked figures show 8,395,306 deadweight tons under construction and under contract."

War Problems Discussed with Editors of the Business Press

Editors of the leading business papers of the country to the number of 65 gathered at Washington in the New Willard Hotel on Thursday, Dec. 13, for the second conference of the year on business and economic issues growing out of the conduct of the war. The first conference held at the same place in May had for its keynote "The more effective use of the business energies of the country through a closer co-operation of the business press with the Government." At that time five Cabinet members and various other leaders in the war activities at Washington addressed the editors. The conference of last week was held in view of the important developments at Washington in the past six months and in the expectation that the men who are forming and carrying out the Government's war plans should by this time give a clearer idea of ways in which the business press could help the Government.

The principal speakers of the day were F. W. Taussig, chairman of the United States Tariff Commission; Eliot Wadsworth, vice-chairman American Red Cross; Dr. Harry A. Garfield, fuel administrator; Frederick A. Delano, member of the Federal Reserve Board; E. N. Hurley, chairman of the Shipping Board; J. D. A. Morrow, secretary of the National Coal Association; Senators Francis G. Newlands and Atlee Pomerene; W. E. Hall, United States Public Service Reserve; Dan C. Roper, commissioner in charge of collection of excess profits; A. W. Shaw, chairman commercial economic committee, Council of National Defense; Dr. Anna Howard Shaw, women's committee, Council of National Defense, and C. A. Richards, chief of bureau of exports.

Much light was thrown on the latest developments in the problems of fuel, labor, railroad transportation, shipping, finance, taxation and war relief.

Detroit Shell Co. Has Big Contracts

DETROIT, Dec. 18.—The Detroit Shell Co. has been organized by Detroit manufacturers with a capitalization of \$2,000,000. Government shell orders amounting to \$30,000,000 have been promised and more are to come later. John Kelsey, president Kelsey Wheel Co., has been elected head of the new company. It is expected that 10,000 men will be employed. The plant will be in operation as soon as machinery can be shipped into Detroit and installed.

E. G. Grace, president of the Bethlehem Steel Corporation, told the 500 guests of the Allentown, Pa., Chamber of Commerce at its banquet last Thursday night that the submarine destroyers which the Bethlehem Shipbuilding Corporation will build for the Government are more than all of the destroyers now in the world. Mr. Grace said he regarded the rapid construction of destroyers as the solution of the submarine menace. Mr. Grace said that of the entire ship construction of the United States, war vessels and merchantmen included, the companies of the Bethlehem Steel Corporation are bearing more than half of the burden. The Bethlehem plants now employ 30,000 men as compared with 9000 five years ago. Charles M. Schwab, who also spoke, said that the payroll of the Bethlehem plants is now \$100,000,000 a year.

The publishers of *Lefax*, *Lefax, Inc.*, Philadelphia, are now including a number of sheets on military subjects as a part of their loose-leaf data sheet service. The sheets so far issued consist of digests of Government publications on such subjects as the cleaning, care and operation of rifles, semaphore and other forms of signaling, etc.

Fire in the plant of the Michigan Limestone & Chemical Co., Buffalo, caused damage to machinery in one building to the extent of \$10,000. Most of the machinery had been moved to the company's new plant or the damage would have been greater.

Lake Ore Shipments in 1917 Less Than in 1916

The final report from Lake Superior iron ore docks shows that the total movement of lake ores by water in the season just closed was 62,498,901 gross tons. This is a decrease from last year of 2,235,397 tons, or 3.45 per cent. Judged from the shipments of last year, the movement of ore by water, together with the all-rail shipments, which are not known until the close of the year, will probably make a total for 1917 of about 64,250,000 tons. The movement of ore by vessel in December this year was not as large as the extraordinary shipments last year. The total was 911,475 tons, or 74,425 tons less than in December, 1916—a decline of 16.06 per cent. The following table gives the shipments by ports for 1917 and the three preceding years:

Port	Iron Ore Shipments from Upper Lake Ports—Gross Tons			
	1917	1916	1915	1914
Escanaba	7,156,856	7,457,444	5,649,289	3,664,454
Marquette	3,207,145	3,858,092	3,099,589	1,755,726
Ashland	7,597,841	8,057,814	5,146,772	3,363,419
Superior	13,978,741	12,787,046	8,342,793	11,309,748
Duluth	20,567,419	21,837,949	15,437,419	6,318,291
Two Harbors	9,990,901	10,735,853	8,642,942	5,610,262
Total by lake	62,498,901	64,734,198	46,318,804	32,021,900
Total all rail		1,924,268	953,947	707,826
Total shipments		66,658,466	47,272,751	32,729,726

The shipments from Minnesota alone for the season—over 44,500,000 tons—were not far from the total season movement of 46,318,804 tons in 1915. The Great Northern ore dock is credited with 18.51 per cent of the total this year, against 17.13 per cent last year, while Duluth and Two Harbors contributed this year less of the total than last year by 0.83 per cent and 0.59 per cent respectively. The Marquette range shipped nearly 1 per cent less of the total this year than in 1916. The 1917 movement is next to the largest recorded, that of 49,070,478 tons in 1913 ranking third.

Shipbuilding Companies Consolidated

The Pusey & Jones Co., Wilmington, Del., which has a large shipyard at that city, has increased its capital stock from \$1,250,000 to \$20,000,000 and will take in the Pennsylvania Shipbuilding Co. and the New Jersey Shipbuilding Co., which have adjoining plants at Gloucester, N. J. The three companies are largely owned and controlled by Christoffer Hannevig, 139 Broadway, New York, a Norwegian capitalist. Mr. Hannevig will be president of the Pusey & Jones Co., H. E. Norbom, vice-president and general manager of the manufacturing department; Finn Hannevig, vice-president; Henry Lysholm, vice-president and manager of the shipbuilding department; R. B. Bullowa, secretary; Stewart Lee, assistant managing director. The number of employees at each of the three yards will soon be greatly increased to take care of Government shipbuilding contracts.

Anti-Publicity Order

CHICAGO, Dec. 19 (By Wire).—Manufacturers and their agents in Chicago have received the following relative to Government orders emanating from the general engineer supply depot, the notice being signed by Lieut. Col. W. H. Rose: "Hereafter no information whatever will be given to the public, without the prior consent of this office, relative to orders you are handling for the general engineer depot. These instructions must be transmitted to your employees and strict adherence thereto enforced by you."

The Virginia Chain Co. has nearly completed its new plant at Parkersburg, W. Va., and nearly all machinery has been purchased and installed. The plant is now about ready for operation, and the concern states it is ready to take on orders for hardware chain, proof coil chain, steel loading chain, crane and dredge chain, and all other kinds of welded chain. This concern is also figuring on making a patent anti-skid chain for use on automobile trucks, for which it expects a heavy demand.

PERSONAL

William M. Bailey has resigned his position as assistant to the president of the Midvale Steel & Ordnance Co., Philadelphia.

George Gorton, president Gorton Machine Co., Racine, Wis., has presented the First Baptist Church of Racine with a brick clubhouse and auditorium building erected at his expense at cost of approximately \$65,000. The formal presentation ceremonies will be held on Christmas Day.

W. C. Swartley and John J. Regan, sales manager and superintendent, respectively, of the Tioga Steel & Iron Co., Philadelphia, have resigned to take effect Jan. 1. They will go into business for themselves, trading under the name of the Philadelphia Steel & Iron Co., with offices in the Commercial Trust Building. They will make a specialty of forgings and other iron and steel products.

L. W. Adams of Bethlehem, Pa., has been appointed general superintendent of the Nova Scotia Steel & Coal Co.'s plant at Trenton, N. S.

James G. Nixon, of the Cleveland office of Manning, Maxwell & Moore, Inc., has been commissioned as First Lieutenant of Infantry, Officers' Reserve Corps, and has been ordered to report to Fort Riley, Kan.

George L. Fairbank, of Fairbank & Co., Cleveland, iron ore dealers, and their traffic manager, have just completed an extensive trip over the different Lake Superior iron ranges.

W. A. Lownds, for several years assistant purchasing agent for the Fulton Iron Works, St. Louis, has resigned to become purchasing agent for the O'Neil Iron Works, Inc., Buffalo.

Samuel A. Benner, vice-president, Federal Export Corporation, 115 Broadway, New York, has sailed for Buenos Aires, Argentina. His visit will comprehend an investigation covering the possible future requirements of the southern republics in steel and he will also supervise the extension of the company's branch house system.

The Blaw-Knox Co., Pittsburgh, has closed its Philadelphia office for the present. O. B. Pulis, who had been in charge of this office, has been transferred to its San Francisco office, replacing Irving Burrows, who is going into Government service.

B. F. Affleck, president, Universal Portland Cement Co., Chicago, was re-elected president of the Portland Cement Association at its annual meeting at the Hotel Biltmore, New York, Dec. 12.

L. S. Love resigned as sales manager of Sherritt & Stoer Co., Philadelphia, to become general manager of The Machine Tool Engineering Co., Singer Building, New York.

George A. Rees has been appointed general purchasing agent of the Chicago Pneumatic Tool Co., with headquarters at 913 Fisher Building, Chicago, vice R. S. Baker, who has found it necessary to devote his entire time to his duties as auditor.

J. C. Bannister has been made a vice-president of the Walworth Mfg. Co., Boston, manufacturer of iron pipe fittings, valves, Stillson wrenches, etc. He has been connected with the manufacture of this type of product for 26 years, starting as foreman at the tapping department of the Haxton Steam Heater Co., Kewanee, Ill., in 1891. He advanced successively to superintendent of pipe finishing mill and chief engineer. For three years he was superintendent of the Kewanee Boiler Co., and when the National Tube Co. took over the operation of Kewanee plant, he was made manager. The Walworth Mfg. Co. purchased the Kewanee works in August, 1917, but Mr. Bannister's headquarters will remain at Kewanee.

F. S. Rutherford, district sales agent at Denver, Col., for the Youngstown Sheet & Tube Co., has resigned to become a Y. M. C. A. secretary, and will sail for France shortly. Mr. Rutherford recently won the

first prize of \$1,000 for a war marching song offered by the New York *Herald*. The title of Mr. Rutherford's song is "Give Me a Kiss, Mirandy."

Chas. S. Ash, until recently employed by the Wire Wheel Corporation of America as its chief engineer and inspector, has resigned to accept a similar position with the National Wire Wheel Works, Inc., Geneva, N. Y., manufacturer of wire wheels for automobiles. Mr. Ash will have complete charge of the engineering and manufacturing parts of the business.

N. B. Payne has opened an office in the Havemeyer Building, 25 Church Street, New York, as an electric crane specialist. Mr. Payne was formerly associated with Manning, Maxwell & Moore, Inc., New York.

John E. Liggett, president of the Connecticut Brass & Mfg. Corporation, has resigned to become chairman of the board of directors. He is succeeded by Harry W. Goddard, former vice-president, as president.

L. B. Schofer, Reading, Pa., has been elected a director of the Reading Car Wheel Co., succeeding L. L. Trowbridge, deceased. J. B. Bowers has taken Mr. Trowbridge's position as superintendent.

W. J. A. London, whose paper on the small turbine situation read before the American Society of Mechanical Engineers at its annual meeting in New York was reviewed in THE IRON AGE, Dec. 13, is engineer of the Steam Motors Co., Inc., Springfield, Mass. The review gave his former connection with the steam turbine department of the General Electric Co., West Lynn, Mass.

L. E. Eisensmith, sales engineer of the American Blower Company at Columbus, Ohio, has been commissioned a first lieutenant in the Engineering Corps and will leave for service Jan. 5.

John M. Howett has opened an office at 34 Huffman Avenue, Dayton, Ohio, and will act as sales engineer for manufacturing firms in iron, steel and machinery lines.

J. McLachlan Clayton, managing director of Clantals, Ltd., Liverpool, England, and of Clayton, Olsburgh & Co., Rio de Janeiro, Brazil, recently sailed from Liverpool for New York. His headquarters while in New York will be with William H. Knox & Co., Inc., South Ferry Building. The object of the trip is to purchase for the Rio house.

Joseph G. Butler, Jr., Loses Art Collection

Joseph G. Butler, Jr., vice-president of the Brier Hill Steel Co., Youngstown, Ohio, lost a priceless collection of art treasures and mementoes of famous men, which he had spent almost a lifetime in collecting, in a fire which destroyed his home in Youngstown last week. The irony of the loss is in the fact that Mr. Butler was just completing, opposite his home, a fireproof museum, which was soon to house the treasures. The fire started from the attempt of a servant to thaw out frozen water pipes. It spread with such rapidity that the house was enveloped in flames within a few minutes. Many valuable works of art were burned, but more priceless were the letters to President McKinley, Mark A. Hanna, Horace Greeley and other prominent men, which Mr. Butler had carefully preserved.

Large Exports of Steel Rails

Steel rail exports in 1917 have been very large. The total for the first eight months of the year was 338,592 gross tons, as compared with 304,773 tons and 184,136 tons for the same period in 1916 and 1915 respectively. Of the total exports to Sept. 1, 1917, France has taken 84,058 tons; Russia in Europe, 51,887 tons; Canada, 37,593 tons; Japan, 35,928 tons; Russia in Asia, 34,233 tons, and Cuba, 26,908 tons. The monthly average of 42,324 tons to Sept. 1, 1917, compares with 38,380 tons per month in 1913, the pre-war record.

The Logansport Machine Co., Logansport, Ind., has increased its capital stock from \$50,000 to \$150,000, and is removing its business to a more commodious building at Fifth and High Streets.

OBITUARY

John L. Haines

John Locke Haines, for some years assistant to Willis L. King, vice-president of the Jones & Laughlin Steel Co., and himself a director of the company, died on Friday, Dec. 14, at Pittsburgh, after an illness of nearly a year. Early this year Mr. Haines had a nervous breakdown and in the summer went to Kingston, Mass., in an effort to regain his health. He re-



JOHN LOCKE HAINES

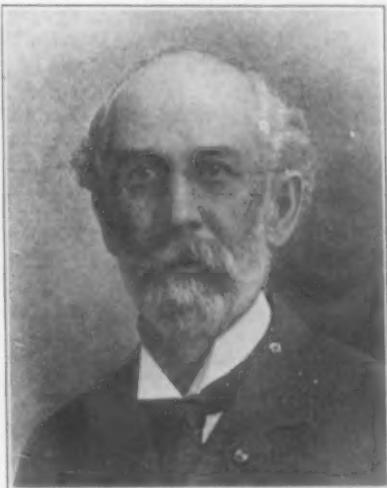
turned to his home about two months ago in worse physical condition than when he went away, and it was known then that he could not recover. Mr. Haines was born in Saco, Me., May 16, 1866, and received his early education in the public schools of Portland, Me. At the age of 21 he entered the employ of the Tepperell Mfg. Co., at Biddeford, Me., manufacturer of cotton goods. Seven years later Mr. Haines went to Boston and for three years was connected with Wallace R. Morse & Co., commission merchants. He went to Pittsburgh in 1897 and entered the service of the Jones & Laughlin Steel Co. He was first employed in the structural sales department and two years later was put in charge of the order department. He was appointed to the position of assistant to the vice-president on Jan. 1, 1910. Mrs. Haines survives him.

JOSEPH H. WOODWARD, president of the Woodward Iron Company, one of the active iron manufacturing companies in the Birmingham district, died Saturday, Dec. 15, after a lengthy illness. He was interested in banking and other enterprises in the district and was vice-president of the First National Bank of Birmingham. He was born in Wheeling, W. Va., Dec. 16, 1843, moved to the Birmingham district nearly 30 years ago with his brother and became interested immediately in the coal and iron industry as well as taking part in the upbuilding of Birmingham. His father before him was an iron manufacturer in West Virginia and interests are still held in that section of the country. The deceased is survived by his widow, one son, A. H. Woodward, chairman of the executive committee of the Woodward Iron Co. and director in the Atlanta, Birmingham & Atlantic Railroad, and two daughters, Mrs. Oscar W. Underwood, wife of United States Senator Oscar W. Underwood, and Mrs. Thomas W. Hopkins of this city.

Joseph Morgan

Joseph Morgan, for twenty-five years chief engineer of the Cambria Steel Co., died unexpectedly of heart failure at his home at Westmont, Johnstown, Pa., Dec. 9. He was born July 27, 1842, in Philadelphia, and was educated at Central High School, that city, subsequently receiving the degrees of bachelor and master of arts. Meanwhile while in the fourth year of his course he joined the steam engineering corps of the United States Navy, entering active service as third assistant engineer in October, 1861, at nineteen years of age. He was mentioned for faithful service on the Brooklyn in the New Orleans engagement under Admiral Farragut in April, 1862. He resigned from the Navy in January, 1866, and entered the service of the Phoenix Iron Co., Phoenixville, Pa., as draftsman. He was chief draftsman in 1868 and then became chief draftsman for the Edgemoor Iron Co. As such he served on the engineering board to report to the board of directors of what is now known as the Manhattan Elevated Railroad. On March 1, 1879, he went to Johnstown as draftsman for the Cambria Iron Co. and was made chief engineer in 1881. On Nov. 1, 1906, he was made consulting engineer of the Cambria Steel Co. He designed and superintended the building of various parts of these works, including six blast furnaces, Bessemer works, blooming mill, open hearth plant, rail mills, and various large mills of the Gautier plant. He was the consulting engineer in charge in 1913 of the building of the Quemahoning Dam, for Johnstown water supply purposes, and the Saltlick Dam.

In 1884 Mr. Morgan went abroad to examine gun and armor forgings, and in 1887 he was appointed a member of the United States Fortification Board. He was a director of the Citizens' Light, Heat & Power Co. and the Johnstown Water Co. and was interested in the Consumers' Gas Co. at the time of his death. He was a member of the American Society of Mechanical Engineers and the United States Naval Institute. Mrs.



JOSEPH MORGAN

Morgan survives her husband with two sons and a daughter. His sons are John Eyre Morgan, Buffalo, and Robert Churchman Morgan, Philadelphia. His daughter is Ellen Eyre Morgan Marshall, wife of Stewart M. Marshall, a few years ago chief engineer of the Cambria Steel Co. and now associated with C. P. Perin in consulting engineering work in New York.

J. W. CREGAR, for many years connected with the sales department of the Niles-Bement-Pond Co., New

York, died suddenly Dec. 10 in Chicago while at the steering wheel of his automobile. The car collided with another, but was stopped before serious damage was done. Mr. Cregar at the time of his death was connected with the Chicago office of his company. He originally was New York manager for the Pratt & Whitney Co., after which he went to Philadelphia and established the J. W. Cregar Agency, which he conducted for several years. He then became manager of the miscellaneous department of the Niles-Bement-Pond Co., in Philadelphia, and about two years ago was transferred to Chicago. He served in the Spanish-American war as a member of Troop C, Sixth Cavalry. He was born in Philadelphia in 1864, and leaves a widow.

ROBERT DOUGLAS MEACHAM, a son of Daniel B. Meacham, of Rogers, Brown & Co., Cincinnati, died suddenly of acute appendicitis at Louisville, Ky., Dec. 15. He was 30 years old and had recently returned from France to recuperate from a year's service as an ambulance driver with the American Hospital Unit of the French Army. Before leaving for France he was traffic manager of Rogers, Brown & Co., with which firm he had been connected in different capacities since leaving college. He was a young man whose life was in every way admirable.

WILLIAM H. SHEPPARD, a retired wire work manufacturer and one of the organizers of the Wire Work Manufacturers' Association of New York and of the Wireworkers' Union, died Dec. 14 at his home in Brooklyn. Mr. Sheppard was a native of London, England, and in early life entered the employ of Joshua Horrocks, a Brooklyn wire work manufacturer, who died recently. Later for many years he was head of the firm of Sheppard & Stolp, owners of the Novelty Wire Works in Manhattan.

WILLIAM L. GUENTHER, vice-president of J. Jacob Shannon & Co., Philadelphia, dealers in mill, mine, railroad, builders' and contractors' supplies, died Saturday, Dec. 15, aged 47 years. He spent virtually all his business career with this firm, having been in its service about 27 years.

May Transport Labor—Short Day on Coast

SEATTLE, Dec. 11.—Special agents from the Government Department of Labor and the United States Shipping Board are investigating conditions in Puget Sound district, with a view to bringing 20,000 additional ship-builders to the Pacific Coast to increase the output of the shipbuilding yards. The building program for the Seattle shipyards now calls for 57 steel steamships to be constructed by the plants now operating and 20 additional vessels by two concerns that are constructing plants and will soon be ready for laying keels. To complete this program thousands of additional skilled workmen will be needed and it is the plan of the United States Shipping Board to provide these workmen if possible. The labor shortage in the lumber industry has been a deterring factor in the shipbuilding work and it is planned to relieve this shortage as quickly as possible.

The Western Pine Manufacturers' Association in Spokane, Wash., has voted to establish the eight-hour day in all of its camps and mills, and so advised Secretary of Labor Wilson, who telegraphed President Wilson of the decision, expressing the belief that "the lumber industry of the Northwest in its entirety will soon adopt a policy which will be a unique contribution toward the effective execution of the war program." This is said to mean that the West Coast Lumber Manufacturers are likely to take a similar step, although this has not been voted on. If such action were taken, the labor problems in the camps and mills would be practically solved and would clear the way for carrying out the Government's gigantic airplane program and shipbuilding work planned.

The Newburgh Shipbuilding Corporation, Newburgh, N. Y., is planning the construction of about 1000 dwellings for employees engaged at its works.

Great Service Flag of the United States Steel Corporation

A service flag 34 x 54 ft. has been suspended across the street from the building at 71 Broadway, New York, occupied by the United States Steel Corporation, in honor of the 11,490 men, including 305 officers, all employees of the United States Steel Corporation, who are now in their country's service in the army and navy. There is nothing on the flag to indicate that it is connected in any way with the corporation. It was, of course, impossible to have 11,490 stars and so the figures 11490—6 ft. high and made of stars—representing that number of men, were placed upon the flag. Among the officers of the corporation are one colonel, Raynal C. Bolling, general solicitor, who is colonel in charge of the air service of the American Expeditionary Forces in France, and five majors, as follows: Bradley Dewey, American Sheet & Tin Plate Co., Sanitary Corps; Dr. S. B. King, American Sheet & Tin Plate Co., Base Hospital Corps; H. S. Durant, American Sheet & Tin Plate Co., Cantonment Division; Orville Benson, American Bridge Co., Engineers' Reserve Corps, and Dr. R. S. McKee, H. C. Frick Coke Co., Medical Corps. There is also one lieutenant, C. P. Crissey, United States Steel Products Co., lieutenant commander in the Navy. The Carnegie Steel Co. leads with 1984 men, and other companies having a large number are the American Steel & Wire Co., 1737; American Sheet & Tin Plate Co., 1417; National Tube Co., 1078; Illinois Steel Co., 1003; Tennessee Coal, Iron & Railroad Co., 911; American Bridge Co., 577.

To Discuss War Emergency Measures

Mobilizing the labor supply, legislative investigating commissions and labor conservation in war time are among the topics of the annual meeting of the American Association for Labor Legislation to be held at Philadelphia, at the Hotel Adelphia, Dec. 27, 28 and 29. The labor supply session is to be held Friday afternoon, 2.30 p. m., at the University of Pennsylvania Hospital, Thirty-sixth and Spruce Streets. Henry R. Seager, secretary U. S. Shipbuilding Labor Adjustment Board; M. B. Hammond, Ohio State University; E. V. Wilcox, U. S. Department of Agriculture; Charles B. Barnes, director New York State Bureau of Employment, and Morris L. Ernst, manager New York State Clearing House for Employment Offices, are among the speakers announced.

The labor conservation session is scheduled for Friday evening at 8 p. m. C. T. Clayton, United States Department of Labor, is to deliver an address on "Meeting Emergency Employment Demands," and V. Everitt Macy, chairman United States Shipbuilding Labor Adjustment Board, is to speak on "Labor Adjustment in the Shipbuilding Industry." Prof. Irving Fisher, Yale University, is president.

Penn Seaboard to Have Plate Mill

The Penn Seaboard Steel Corporation, Philadelphia, is completing arrangements for the equipment of one of its buildings as a plate rolling mill. The new mill will be a part of the Baldt plant of the corporation, located near New Castle, Del. This plant has a large open-hearth plant and has been furnishing ingots to the British Government. Upon the termination of that order, the steel-making capacity will be utilized to furnish ingots to the new plate mill. It is expected that the mill will be ready for operation in four or five months, and it probably will be utilized at first largely for the production of ship plates.

The Ohio Iron & Metal Co., Chicago, has opened a new office in Cleveland, in charge of B. L. Newman, as district manager. This company has for several years been represented in Cleveland by H. G. Stalnaker, who is now in charge of the Cleveland office of the Stalnaker Steel Co.

The Scovill Mfg. Co., Waterbury, Conn., is reported to be contemplating building a dormitory to house 500 women employees.

New Alloy of Copper and Aluminum for Bearings

A new alloy of copper and aluminum has been put on the market which shows some unusual properties. That it can be substituted successfully as bearings for the regular tin-bearing alloys is said to be established by recent tests by a large railroad. The alloy is called Dirigo and consists mainly of copper and aluminum. It can be cast, spun, drawn in wire, brazed and soldered with ordinary silver, and it is said to be capable of temper so as to be as hard as steel. A distinguishing feature is that certain compositions have a gold color, which has led to its incorporation in various utensils, ornaments and jewelry. Dirigo bronze is reported to have a tensile strength up to 106,000 lb. per sq. in., to resist salt water and to be highly resistant to acid. A test made by the Western Electric Co. on a brand drawn to hard wire, 0.008 in. in diameter, showed a tensile strength of 132,000 lb. per sq. in. The grade most suitable for bearings has a tensile strength of 71,000 lb. per sq. in. Another feature is its heat conductivity.

The method of making the alloy is not made public. Aluminum and copper are treated in the molten condition in the presence of other metals, most of which pass away. Production is carried on by the Hart Trading Co., Tribune Building, New York, which also conducts an export business in metals and other products.

Fatalities in Mines and Metallurgical Works

The summary statement of fatalities in the mineral industry of the United States for the year 1916 shows a gratifying decrease, according to statistics compiled by Albert H. Fay of the U. S. Bureau of Mines, Department of the Interior. The number of men employed in 1916 was 1,128,257, as compared with 1,067,929 in 1915 and the total number of fatalities in 1916 was 3224 as compared with 3076 in the previous year. The principal increase in men employed was in the metal mines and metallurgical works, while there was a slight decrease in the coal mines and quarries.

The fatality rate per 1000 men employed for the industry as a whole is 2.86 as compared with 2.88 in 1915, while the same figure equated to a 300-day basis is 3.37 as compared with 3.74 for 1915. The principal decreases, based on the 300-day basis, are as follows: Coal mines in 1916, 3.93 per 1000 300-day workers as compared with 4.44 in 1915; metal mines, 3.62 as compared with 3.89; ore-dressing plants, 1.41 as compared with 1.57; smelters, excluding iron blast furnaces, 0.73 as compared with 1.05; by-product coke ovens, 1.35 as compared with 1.75. Quarries and bee-hive coke ovens show slight increases.

Ship Plants to Lay First Keels

The American International Shipbuilding Corporation and the Submarine Boat Corporation, the Government subsidized ship assembling plants, will begin actual shipbuilding operations by Jan. 1. Chairman Edward N. Hurley of the Shipping Board will drive the first rivet in the first keel to be laid at the Port Newark Terminal yard of the Submarine Boat Corporation on Thursday of this week. The American International Shipbuilding Corporation expects to lay its first keel at the Hog Island plant by Jan. 1, and a keel will be laid about every three days thereafter until 50 have been laid.

The Hess Steel Co., Baltimore, unfurled a large American flag and a service flag containing 15 stars on Dec. 15. All the employees took part in the exercises, and addresses were made by Arthur V. Farr, sales manager; Erwin L. Malone, assistant sales manager, and Joseph McCord, traffic manager.

Princeton University, Princeton, N. J., has inaugurated a course in ordnance and gunnery, in charge of Lieutenant E. B. Nixon, U. S. N., supplementing its course in navigation and naval work.

Fifth National Foreign Trade Convention at Cincinnati

In issuing the call for the fifth national foreign trade convention, which will be held at the Hotel Gibson, Cincinnati, Feb. 7-9, 1918, Chairman James A. Farrell of the National Foreign Trade Council writes:

American participation in the war against Germany has laid a new obligation upon the foreign trade enterprise of the United States, and at the same time presented it a new opportunity. To consider that obligation and that opportunity; to discuss what has been done by the different elements of foreign trade, and to give serious thought to the demands and the problems of the future, delegates from every part of the United States, representing all phases of commercial and civic development, will assemble for the three days' sessions at Cincinnati. * * *

More than ever the foreign trade of the nation serves a vital national purpose in maintaining the gold reserve and sustaining the huge bulk of national credit upon which the necessities of war are making such enormous demands.

The theme of the convention will be "The Part of Foreign Trade in Winning the War." The topic of the opening session on Thursday, Feb. 7, will be "Foreign Trade Achievements Up to Date." On Thursday afternoon, "After-War Conditions of Foreign Trade" will be considered. Group sessions will be held, one of these being devoted to exports and imports control. It will be attended by representatives of the War Trade Board.

Coal Shortage at Baltimore

The coal shortage in Baltimore and vicinity is so acute that some of the plants have been compelled to curtail their operations and unless relief comes soon, it is feared that many of them will have to suspend operations entirely. One of the biggest industries which is feeling the pinch of the shortage is the Sparrows Point, Md., plant of the Bethlehem Steel Co. This plant already has cut down much of its work and will be compelled to further curtail unless relief is afforded.

The Bethlehem company and a large number of other concerns were closed for several hours a few days ago because the Consolidated Power Co., which supplies them with power, was unable to get coal. This concern now has a little, but it is feared that in a few days it will be out again and the same action will have to be resorted to. When the plants closed there were many complaints and a little fuel was received. But this will not last long.

Fabricated November Business at High Level

Following the 111,000 tons of structural steel work put under contract in October is a total of 138,500 tons for November. This is in accordance with the records of the Bridge Builders and Structural Society, as collected by George E. Gifford, 50 Church Street, New York, its secretary. According to these records the November engagements amounted to 77 per cent of the entire capacity of the bridge and structural shops of the country. This makes the total for the eleven months of the year 1,081,000 tons, or more than in all of 1913 or 1914. The November business, chiefly for Government work, is the largest this year.

The Erie Forge Co., Erie, Pa., gave a banquet Dec. 8 at the Lawrence Hotel in that city to representatives of the Day & Zimmerman Co., Philadelphia, consulting engineer, which placed contracts for the forge company's new plant, and representatives of 18 companies that have sub-contracts. About 150 were present. Robert F. Devine, president of the Forge company, acted as toastmaster, and a number of the guests, including naval officers and Julian Kennedy, Pittsburgh, were speakers.

The Austin Co., Cleveland, has established its Eastern headquarters at 217 Broadway, New York, to which it has removed its Bridgeport, Conn., office. L. D. Stauffer will be in charge of sales, H. B. Phillips of engineering and K. A. Bitchard of construction.

NEW WAR COUNCIL

General Crozier Transferred—General Goethals Called into Active Service

WASHINGTON, Dec. 18.—A war council designed to oversee and co-ordinate all matters of supply of the armies in the field and the military relations between the armies and the War Department has been created by Secretary of War Baker. The council will consist of the Secretary of War, the assistant Secretary of War, the Chief of Staff, Maj. Gen. Henry G. Sharpe, Maj. Gen. Erasmus M. Weaver, Maj. Gen. William Crozier, and Maj. Gen. Enoch H. Crowder.

The functions of the council are set forth in the following statement issued by Secretary Baker:

The Council will act through the Chief of Staff and will be provided suitable accommodations and facilities for the transaction of its business. The work of the war council is of the highest importance and there will be added to the council from time to time general officers of large experience, so that it may constitute the main reliance of the department for the large planning and initiative necessary to make our support of the armies in the field most effective and helpful.

From time to time members of the council will be directed to spend in the theater of war the time necessary to make general observations and special studies for the information of the council, to the end that there may be constantly present with the council officers of distinction and ability who have had opportunity for personal observation in the theater of war.

All details as to the council are at the pleasure of the Secretary of War. While any officer is detailed to the council provision will be made to free him from administration duties and responsibilities.

The war council does not take over the specialized duties of the General Staff or the War College, but is intended to bring to the larger problems of the department both the experience and general training of the officers of most mature years and largest experience in the service.

While the officers composing the council will retain general supervision of the bureaus from which they are detailed, the active work thereof will be delegated to assistants. Secretary Baker announced that Maj. Gen. George W. Goethals had been recalled to active duty and would become acting quartermaster general, releasing Maj. Gen. Sharpe for service with the council. Major General Weaver will be relieved by Brig. Gen. Barrette, who becomes acting chief of coast artillery, and Maj. Gen. William Crozier by Brig. Gen. Charles Wheeler, who becomes acting chief of ordnance.

Government Takes Two Factories

The United States Government, which recently took over the plant of the General Vehicle Co., Long Island City, N. Y., at a reported valuation of \$2,500,000, has also acquired title to the neighboring factory of the Stewart-Warner Speedometer Co., the latter building having been completed only a few months ago and never occupied. It is reported that Col. George Montgomery, now in command of the Frankford Arsenal, Philadelphia, will be in charge of the manufacturing operations at both plants. The buildings will be used for the manufacture of airplane engines and gas masks.

Records for Electric Furnace Lining

The Harrow Spring Co., Kalamazoo, Mich., states that for a period commencing Sept. 27, 1916, its 6-ton Heroult electric furnace, lined with standard silica brick above the slag line, had an average of 149 heats per lining and that the average roof record has been 132 heats. The best record on a lining was 172 heats and on a roof 169 heats. The output during this time has been largely alloy steels, including nickel, chrome-nickel and some vanadium, all under 0.30 per cent carbon. There has been also a large amount of plain high carbon steel.

The Vail-Rentchler Co., Hamilton, Ohio, whose increase in capital stock was recently noted, has plans under way for erecting a new factory building that will have a yearly capacity of 3000 farm tractors.

MANY PLANTS IDLE

Cleveland Suffers Severely on Account of Coal Shortage

A crisis in the coal situation in Cleveland was reached last Friday when the Cleveland Electric Illuminating Co., which supplies power to a large number of industrial companies, notified these consumers that their electrical power would be shut off the following morning. As these companies depend entirely on the service of the Illuminating Company for their power, their plants necessarily had to be shut down. The cutting off of power resulted in the entire suspension of operations in about 100 plants in the metal working field and the throwing of over 100,000 men in Cleveland out of work. Among those affected were the steel plants of the Upson Nut Co., Empire and Union Rolling Mill companies and a large number of plants engaged in shell and other Government work.

Through efforts of the city and State authorities and appeals to the fuel administrator in Washington, a liberal supply of coal was taken into Cleveland Sunday, a large portion of this coming from boats that had been loaded for shipment to upper Lake ports but had been tied up with their cargoes at Lake Erie ports owing to the sudden cold wave that put a stop to navigation. This coal supply enabled the Illuminating company to restore its supply of electrical current to all consumers Monday, so that plant operations were resumed, and there is apparently no danger of another shut down within the next few days.

The American Steel & Wire Co., which shut down its nine Cleveland plants Dec. 8 because of the scarcity of coal, after nine days' suspension resumed partial operations Monday in all its plants except the Consolidated and H. P. works. Two of its five blast furnaces, which had been banked nine days, were placed in operation, and it was planned to start the other three a day or two later.

Expansion of Manganese Ore Mining

The expansion in the mining of manganese ores since the war began is characterized as nothing less than remarkable by W. C. Phalen of the staff of Dr. Charles L. Parsons, head of the mining-technology division of the U. S. Bureau of Mines, who is quoted by the *Engineering and Mining Journal*. Mr. Phalen has visited every important manganese-producing region of the United States in the last year. During the last five months he has made a survey of the manganese resources of the West. While hundreds of holes have been opened and domestic production has been forced to a higher point than believed possible a few years ago, certain metallurgical problems must be solved to make available the large reserves of highly siliceous ores if the country is to become independent of foreign supplies. The large reserves of rhodocrosite in the Butte district in Montana and to a less extent in San Joaquin County, Cal., particularly impressed Mr. Phalen with the necessity of attempting in metallurgical practice to use these as well as large deposits of high silica manganese ore in certain of the Western States.

To Build Boiler Tube Mill

The International Steel Tube & Rolling Mills, Inc., a new corporation, of which C. H. Hopkins, 435 Guardian Building, Cleveland, is secretary and treasurer, has announced that it will build a new 50-ton lap-weld boiler tube mill between Lorain and Warren, Ohio. Plans will be ready soon. The plant is to be erected on a 100-acre site. About \$400,000 will be spent for buildings and machinery.

The name of the Massachusetts Saw Works, Springfield, Mass., has been changed to the Victor Saw Works. The change is in name only, the management, organization and product remaining as heretofore. The name is changed to more closely identify it with the name of the product, Victor hack saw blades.

WAR PROBLEMS DISCUSSED

Chamber of Commerce Committees Hold Meeting in Washington

WASHINGTON, Dec. 18.—The concessions that must be made to the Government by the industries of the country to assist in the great drive now on to concentrate all resources upon the task of winning the war was the chief theme under discussion at the meeting of the war service committees of the Chamber of Commerce of the United States, held here on Dec. 12. The necessity for reducing the consumption of coal and the use of electrical power, a substantial reduction in the employment of the transportation facilities of the railroads, and the conservation of all products needed for food purposes were impressed upon the members of the conference by all the speakers, who included Director Gifford of the Council of National Defense, Chairman Willard of the War Industries Board, Fuel Administrator Garfield, Chairman Parker of the Priorities Committee, Clarence M. Woolley of the War Trade Board, and George N. Peek, chief of the new Bureau of Manufacturing Resources. It was made clear from the remarks of these speakers that, while the Government will pursue a very conservative policy in its treatment of so-called non-essential industries, it is expected that all manufacturing concerns which do not directly contribute to the prosecution of the war will reduce their consumption of coal, their utilization of transportation, and their consumption of materials which can be used for war purposes, even though the result is to substantially curtail output and reduce net earnings.

Not an Easy Task

"It is not going to be an easy task," Director Gifford said, "to organize industry in this country completely, but we believe we are going to do it effectively so that we may go ahead in the work of winning the war. It is obvious that some industries will be more essential than others, but it would be foolhardy to think that the time will not come when the so-called less essential industries may not be needed."

Mr. Gifford urged the representatives of all industries to speedily get into touch with the new industrial representative of the War Board, George N. Peek, who would at all times be ready with advice and assistance in indicating ways by which the less important industries from the war standpoint could co-operate in the great task now confronting the country.

Chairman Willard of the War Industries Board told the conference that a mistake has already been made in the development of the war program, a natural mistake which also was made in England. "We have," he said, "concentrated our orders too much in certain localities, and by so doing we have overdrawn on the available supply of electric power in some cases. Another result has been the bringing of workmen into localities where there has not been a sufficient preparation for housing and boarding, and there have also been introduced transportation difficulties that are most difficult to solve. It has, therefore, become very necessary that we should stop and consider, before placing any additional orders for munitions or war material, whether the placing of the order at that particular point is going to aggravate one of the problems I have just mentioned.

"The Council of National Defense has recently created a new department which we have placed in charge of Mr. Peek of Moline, Ill., one of whose chief functions will be to acquaint himself with the requirements of the Government so far as additional producing capacity is concerned and also to gather information showing where there are other plants whose activities may have been curtailed by the general war program, plants of such a character that they could be used to do some part of the particular work in mind.

"Now, I wish to impress upon you that we must all do anything and everything necessary to win the war. There can be no compromise on that question, and if to do that it were necessary to take everything in

Pittsburgh or Philadelphia or Wilmington or Bridgeport, of course, we would do it and everything that went with it; but it seems to me that such a course is not necessary, and if it is not necessary, we ought not to do a single thing in our efforts to win the war which will cause unnecessary industrial disturbance or make more difficult than otherwise the adjustment that must come when peace arrives."

Fuel Troubles

Dr. Garfield, speaking for the Fuel Administration, said that there were two ways of dealing with the present situation. "One way," he said, "is to cut off from the list of industries those things which are least essential. The other is to prefer those which are most essential to the conduct of the war. From my angle of approach, the preferred consists of enterprises most likely to contribute immediately to the war; but that does not answer the question wholly. At one time we had before us a list made up by different people interested in different ways, and when we began analyzing it we did not need to spend more than one evening on it to be sure that any one of the industries, if cut off from fuel supply, would carry a much further injury to the public than we could well reckon."

George N. Peek, the industrial representative of the War Industries Board, said that he looked for hearty co-operation between the board and the manufacturers of the country. No industry, he said, would be classified as non-essential, but there were many non-essential portions of some industries—odd sizes and styles and unnecessary products—which might be cut down, while actually strengthening the industry and proving beneficial to the Government and the public at large. Mr. Peek said he desired personally to meet manufacturers having problems and promised to do everything possible to assist in their solution.

The conference finally adopted a resolution under which committees, representing the leading industries of the country, will be formed to serve in an advisory capacity to the war committee of the Chamber of Commerce. It is expected that the most important of these committees will establish headquarters in Washington and assist in advising the War Industries Board in the distribution of orders for war material, in the placing of priority orders, and in bringing about fuel and food conservation, etc.

W. L. C.

Serious Coal Conditions

WORCESTER, MASS., Dec. 18.—The coal situation is extremely serious and no relief is in sight. The Fore River shipyard was obliged to lay off its night shift, but has secured 500 tons of coal from the Boston Navy Yard and has resumed night work. It has been announced that the Watertown Arsenal will have to curtail operations to-day if coal was not received. The New England Power Co., which supplies hydroelectric power for industries from Springfield, Vt., to Willimantic, Conn., and Providence, R. I., has been compelled to cut down its supply about one-sixth and has adopted a policy of shutting off power in whole sections of their field one day each week. Several of the most important factories in Worcester, Mass., will be closed all day Wednesday on this account. The company operates several steam plants and has a reciprocal agreement with others and the shortage of coal is responsible for the shortage of current. Unless relief is secured this week, many private power plants will be compelled to close down. The supply of domestic coal is equally insufficient and threatens to close many large boarding houses in the industrial centers, thereby affecting the labor situation somewhat.

The next meeting of the Philadelphia section of the Association of Iron and Steel Electrical Engineers will be held on Jan. 5, 1918. A paper entitled, "Electrically Operated Bridges" will be presented by J. C. Reed and Merwyn J. Hocker, electrical engineers of the Bethlehem Steel Co., Steelton, Pa. The paper will be illustrated with lantern slides.

Crozier Tells of Great Progress Made

(Continued from page 1474)

I think the cost to the Government where we have used this form of contract has been less than it would have been if bids had been submitted in regular course, because the manufacturers would have been obliged to cover themselves by such large estimates against all risks that prices would have been higher. There have been some very prominent cases where manufacturers would not quote any figure at all. They simply would not take a contract. They had had their fingers burned in furnishing things to the allied governments and they would not consider a contract on a fixed price.

Manufacturing Rifles

Upon request by a member of the committee to cite a case in which the manufacturers refused to accept a contract on a fixed price, General Crozier stated that the Department had been unable to induce manufacturers to furnish rifles on that basis. He said:

They would not quote any price. They told us that any price they would be willing to mention would look so unreasonable that they did not want to have their names attached to it. Thus the rifle contracts were given on the basis of cost-plus 10 per cent for profit. This placing of contracts on the cost-plus basis required us to do something that we have never done before, and that was to go into the manufacturers' establishments and into their accounting departments and find out what their things were costing them. In the Ordnance Department we have taken a good deal of care to find what our things were costing us, but as regards the private manufacturers we have had no figures except as to what we have paid for their goods.

Now, to secure such figures we had to go into a number of establishments and this work necessitated the forming of a cost-accounting division in my office, which I proceeded to do very early in the war, securing as the head of it a member of a firm of chartered accountants. This man came to us, giving up a large salary many times what he gets as an officer with the rank of major, which is the highest I have been able to give to any of these officials.

President Allowed \$35,000,000

Replying to a question, General Crozier said that about a month before the appropriation act of Oct. 6 was passed, the President allotted to the War Department about \$35,000,000 of the \$100,000,000 emergency fund appropriated by Congress in the spring of 1917. With this fund the bureau was enabled to place certain contracts which could not be placed until the money was actually in hand.

Continuing, General Crozier described to the committee an elaborate inventory of the manufacturers of the country capable of doing work for the Ordnance Bureau which resulted in the preparation of a card index covering practically every concern in position to take such war orders. This list was afterward carefully canvassed with copies of drawings and specifications of things that would be needed in large quantity and the replies received were filed and digested.

"We got some very valuable assistance from the General Munitions Board," said General Crozier, "in selecting establishments with which to place some of our large orders."

At this juncture, Chairman Chamberlain inquired whether the War Department had undertaken to avail itself of the experience of the British army in correcting mistakes previously made. General Crozier replied:

We have undertaken to inform ourselves as to what their experiences were, but some of the most radical things that they did in order to secure an output were things which required legislation and which, therefore, we have not availed ourselves of. We have endeavored to avoid such mistakes as they made in the beginning. For instance, there was a different appreciation at the outbreak of the European war of the relative importance of shrapnel and high explosive shells and that which developed soon after the war commenced. All the tables of supply of artillery munitions contemplated a very much larger appreciation of shrapnel as compared with shells than that which prevails now, and we learned that lesson from them and immediately changed our tables of supplies so that we have not

made the mistake of issuing orders for a larger proportionate number of shrapnel than we should have.

Then there are certain things the British have endeavored to correct by legislation and which they have at least partially corrected, which thus far we have had no means of correcting. One of them has been the regulation of labor. We are kept back by the shifting of labor. There is in many of the establishments which are doing work for us a very rapid turnover of labor; that is to say, the men come and stay a short time and then other men must be secured to replace them. That is a very expensive process and one which is very hostile to efficiency. They solved that problem, or attempted to solve it, in England by enacting legislation to the effect that no workman should leave a munitions establishment—that is what is called a "control" establishment, which is one taken under the control of the Ministry of Munitions, not to operate it but to employ it in the manufacture of munitions. No workman is allowed to leave such an establishment without what is called a "leaving" certificate, and if he should do so, it is made an offense for any other person to employ him without the production of the required certificate from the establishment he had left.

Enticing Employees

In response to a question, General Crozier referred to the United States statute, now nearly 100 years old, making it an offense to entice an employee of an arsenal away from his work. This law, he said, had probably never been invoked and it was wholly inadequate to meet the situation referred to. Chairman Chamberlain asked whether there was any special reason for employees to leave the arsenals, and especially as to whether complaints as to wages or treatment had been received. General Crozier replied:

I am not referring particularly to men leaving the employment of the Government at the arsenals. Our real difficulties come because they leave the employ of private manufacturers doing the work of the Government to go to some other employment. The amount of work which is being done by the Ordnance Department now at private establishments is so great in comparison with that which is being done at arsenals that the arsenals have dropped back into the status of mere manufacturing laboratories to establish standards.

As to whether any steps have been taken to remedy the labor situation, General Crozier said that the Council of National Defense has recently created a division to investigate the labor problem and that in the Ordnance Bureau an industrial section had been established in the effort to formulate a remedy for existing difficulties. He continued:

One of the reasons for this rapid change of labor is the hearing that higher wages are paid somewhere else, and off the men go in search of better pay. The wages they are getting are oftentimes so high that they can very well afford to lose a few days in hunting for another place. Another difficulty is that the men are attracted in large numbers and by tempting offers to some place where they find there are no quarters in which to live, and after enduring a very great deal of discomfort, they travel on to some other place looking for better conditions. The housing question under the artificial conditions which have been created by the demand for labor in certain centers did not exist before and requires very careful consideration. We have gone so far as to examine the laws to ascertain whether our manufacturing appropriations are available for expenditures for erecting temporary dwellings for the employees of private establishments. At places where the Government has no buildings of its own, nothing of that kind has yet been done, but I think that some remedy for this situation will have to be found very soon.

I do not find it disclosed so far as we have gone that there is an actual shortage of labor in this country of the kind needed in munitions making, and I am doubtful whether there is such a shortage. We have not taken enough men into the military service as yet to create such a shortage. You doubtless realize what a difference there is between our situation and that of England. They have taken 40 per cent of their men—not 40 per cent of their men of military age, but 40 per cent of their total male population—into the army. We have not taken 5 per cent. They have had to bring some of their skilled workers back, but they have substituted others for them. With reference to skilled workers and their entering the military service, I am informed by members of the British Ministry of Munitions who have been close to the subject that if any man having mechanical skill is employed for any purpose in which that skill is not utilized, it is regarded as a waste which the country cannot afford. They say—and it has been the ex-

perience of other countries of such civilization as ours—that there is not enough skilled labor in the country to supply the munitions for such a war as we are in; that the supply is short and, therefore, that no skilled man should waste his skill. Of course, I refer to the kind of skill that is involved in munition making. We are to have a large repair establishment over in France, and as to the enlisted men it is contemplated that they will be worked to advantage there. That we are not now prepared to do in this country.

Capacity of Foreign Plants

Concerning the capacity of British munition manufacturers to do something more than supply the British army with munitions, General Crozier, in reply to a question, said that the British factories could produce a surplus of some things and this was also true of the French factories. He said:

Owing to the much more prominent place which artillery has taken in this war than was anticipated in the preparations for war in Europe, it has been necessary for both England and France to greatly increase the artillery manufacturing program. They have done that and they have provided all the original equipment of their expanded forces, and still the wastage is not sufficient to use the capacity which they have created. Therefore, we have offers from both England and France to manufacture artillery for us and we are taking advantage of it to a considerable extent. It is most fortunate for us, because it safeguards us to a very considerable extent from the consequences of our long neglect in this country.

"With the advantages that you have just spoken of," asked a member of the committee, "will the American army be able to sufficiently supply itself with artillery?"

"The indications are," answered General Crozier, "that we shall be able to do so with the assistance I have referred to and to do it promptly. We are getting from France under manufacture since the first of last August a very considerable supply of the two most important pieces of artillery that the armies are equipped with, the 75 mm. field gun, which is about 3 in. in caliber, and the 155 mm. howitzer, which is about 6 in. in caliber. They are making a number of those to supply all the troops that we are sending over and all we will be sending over for some months to come, which enables us to keep over on this side for training the large forces we have in cantonments, the artillery of our own manufacture which is most essential. We are very short of it over here and it is a God-send that we have been able to keep what we have. But we are not short on the other side and will not be short on the other side at all."

"How long before you will be able to catch up on this side?"

"We will be fairly well caught up in the most important things by next summer."

"Have you had occasion to engage Canadian manufacturers?"

"We have given some orders in Canada for the manufacture of artillery ammunition, but there is no manufacture of artillery itself in Canada."

Interested in Labor Questions

Members of the committee manifested much interest in the labor situation as described by General Crozier and recurred to it several times. Senator Weeks of Massachusetts said:

I have been at the navy yard and at these great shipbuilding plants and arsenals in Massachusetts and a great many private plants which manufacture for the Government where a serious question has been brought to my attention a great many times. There are numerous complaints, justifiable in my opinion, of the injustice that is resulting to the Government not only from private plants bidding against each other or against the Government, but even from two departments bidding against each other. As an example, a man employed at one of the arsenals was earning \$900 a year and he was offered \$900 more if he would go with a private contractor. Now, if that contractor had a contract based on cost-plus 10 per cent, of course that produces a gross injustice from the standpoint of the Government, and what I want to know is, do you know whether any effort is to be made to adjust this labor question so as to prevent such experiences as the one I have described?

General Crozier replied that the Council of National

Defense was working on the subject and that he was personally developing the details of a plan which he would submit to the War Department at an early date, but which he would not care to discuss in public. He said:

I have had complaint after complaint from manufacturers doing work for the Government on the cost-plus basis that their men are being enticed away from them by other contractors working on the same basis but paying higher wages. Such contractors have no reason for keeping the general cost down; it is nothing to them what wages they pay, for the higher the cost the more the contractor gets. These contracts contain a stipulation giving the department the right to examine into the reasonableness of all expenditures, and I have in several instances called the attention of the contractors to the stipulation in the contracts and we have sent out a general circular to all the arsenal plants in which I call attention to the Government's right and give warning that it will certainly be exercised if this process is found to be a serious evil.

Every Moment Utilized

During the cross-examination to which General Crozier was subjected following his direct statement he repeated with renewed emphasis his original declaration that every moment of time, after Congress recognized the great emergency confronting the country, had been utilized in making preparations and emphasized the fact that there is a vast difference between the making of a single rifle, machine or field gun and the fitting up of the entire manufacturing capacity of the country for quantity production. He also made the point that at the time the United States became involved in the war the British and French governments, especially the British, were utilizing the existing capacity of the leading American manufacturers for material for their own armies and that it was the consensus of opinion among American military experts that it would be a serious blunder, from the standpoint of all the nations fighting Germany, to interrupt these deliveries of material needed by armies actually in the field in order to provide equipment for American troops who would not be in France in any considerable numbers for many months to come.

In their zeal to secure from General Crozier answers to their individual inquiries it frequently happened that several members of the committee asked questions simultaneously, which rendered it difficult for the witness to make satisfactory categorical answers. The stenographic report of the hearing reproduced in the daily papers in a more or less garbled form, therefore, gives a very incorrect impression of General Crozier's testimony, which was at all times direct and positive and wholly without evasion.

Replying to a question by Senator Hitchcock as to why the American troops in France are using French artillery, General Crozier said:

As to the necessity for our army to have a supply of French artillery, I would say that no appropriation that could possibly have been made at the time of the outbreak of the war could have had any effect worth mentioning with regard to the artillery situation. It is true that ordnance for the Allies was being manufactured in this country at the time we entered the war, but this machinery was not available for manufacturing ordnance for this country if we continued to manufacture for the Allies, and it was our policy to do as little as possible to interfere with production for our Allies because they were actually engaged in the war and in need of the material. We thought that it would be poor assistance in the war if we were to start in by depriving them of fighting material in order to have it ready for American troops who would not reach the theater of war in any considerable numbers for a long time to come. Starting with appropriations in April for the procurement of artillery, no one could hope to have artillery in any substantial quantity by December of the same year.

Declines to Comment

General Crozier declined to comment on the fact that the emergency appropriation of \$100,000,000 given to the President at the outbreak of the war was not immediately used for the artillery purposes, saying that it was reserved "for certain particular purposes," making it clear that the allotment of these funds was a matter which in no way came within the jurisdiction of his bureau. He stated frankly, however, that some

time in August and before Congress had passed the appropriations for which estimates were submitted in June, he succeeded in securing \$35,000,000 of the President's emergency fund in order to make certain contracts which could not legally be entered into until after the money was actually in the possession of the department. He called attention, however, to the fact that the sum allotted to the Ordnance Bureau in this connection was negligible, except for the technical purposes of meeting the requirements of the small contracts referred to, as it amounted to only one-thirtieth of the estimated needs of the Ordnance Bureau.

While General Crozier at all times sought to avoid criticizing either Congress or any branch of the Government, yet when members of the committee demanded to know why quantity production had not been obtained in a few months after the beginning of the war, his replies were very pointed.

"I am frank to say," said Senator Hitchcock, "that many army officers seem to hold the opinion that there is a great delay in the delivery of the necessary things that Congress thought it had provided for in advance. I think the committee should know the facts."

"There is no doubt about that," replied General Crozier. "There are many things that it provided for, but it did not provide for them in time. They should have been appropriated for and provided for some years ago. No one had a right to expect much in the way of available war material from any appropriation made so recently. There has not been enough time."

National Plant Closed

The committee then took up the subject of the manufacture of rifles, concerning which General Crozier said:

At the outbreak of the war we had in the United States and our various possessions in the hands of the army, the National Guard, and in the armories and storehouses, something like 700,000 rifles of the so-called Springfield rifle of the model of 1903. I do not believe it is claimed by anybody that this rifle has its superior in the world at the present time. Many of these rifles were in the Philippines and elsewhere, but about half a million were available. The year before the war, the two national armories were working at greatly reduced capacity and had been for several years. One of them had been closed for some time and the other was worked at not one-quarter its capacity.

"Why was that?" asked Senator Wadsworth.

"Because of lack of appropriations," replied General Crozier. To the question, "Was the appropriation decreased to such an extent as to cause one of the arsenals to stop manufacturing?" General Crozier replied:

Yes, indeed, sir. For several years along about 1906 the appropriations for the manufacture of small arms, rifles, pistols and swords ran about \$1,700,000 per year. I do not recall the exact figure for the year immediately preceding the act of June 3, 1916, but before that it had gotten down as low as \$200,000 a year.

Now, the capacity of the two Government factories, running full as at present with two shifts of ten hours each, which we think is the advantageous way to run them, and when we confine the output strictly to rifles and make no spare parts or pistols, is something like 1200 per day. Now you will see at once that an output of 1200 per day, when we actually attain it, would mean a long time in the arming with rifles of an army of a million men.

Under the act of Aug. 29, 1916, an appropriation was made sufficient to justify reopening the armory which had been closed and increasing the rate of manufacture of the rifles at the other armory. The orders were promptly given and the activities of those two armories were increased, but it must be remembered that resumption of manufacture on a considerable scale under such circumstances as existed at that time is a long process. The operatives had all gone away from the armory that was closed and many had left the other one to go into the employ of private small arms factories which were engaged on large orders for England and Russia, and many of the principal employees, the indispensable men, including superintendents and foremen, could not be gotten back, so that the reorganization was a slow process and the full capacity of these armories has been available for only a comparatively short time. It takes a long time to get together and train a force to operate a productive organization such as this.

Now, under these circumstances it was evident that the two national armories were nothing like a sufficient reliance for the supply of rifles; therefore, in advance of any legislation fixing the size of the force, I proceeded to see what could be done in the matter of rifles. I had surveyed the situation before and knew where to go. There were three private factories, the Winchester Repeating Arms Co. at New Haven, the Remington-Metallic Arms & Cartridge Co. at Ilion, N. Y., and the Remington Arms Co. at Eddyville, Del., which were making rifles for the British. There were also two large factories manufacturing rifles for the Russians. These three factories were turning out rifles of a modified Enfield pattern and the question at once arose as to whether we should give orders for the manufacture of those rifles for our forces or whether we should modify the rifles. There was no question but that we would have to use those three factories, for they were the only ones of necessary size engaged in the manufacture of arms.

Continuing, General Crozier described the adoption of the Enfield rifle, rechambered to fit Springfield ammunition in order to avoid the use of two kinds of cartridges. Some time was taken in making the necessary changes, but during this period the factories in question were working at full capacity turning out rifles for the British army, so that no time was lost from the standpoint of the general result of rifle production.

Questions About Delays

Replying to a question by Senator Wadsworth as to whether the superiority of the modified Enfield rifle and the concentration on one kind of ammunition offset the delay incident to the change, General Crozier said:

"Of course, that depends on what the delay really is and as to its results. I wish to say to you that no United States soldier has been or will be delayed five minutes in reaching the field of war because of the absence of modern rifles. There have been compelling necessities which have limited the rate at which we could put our forces in action in the theater of the war. There has been and will be no delay for rifles, and while the British rifle is a good one, it is not as good as ours."

"Has there not been considerable delay in training troops in this country?" asked Senator Wadsworth.

"None that is going to interfere in the least."

"You think the scarcity of rifles has not delayed it?"

"I do not think it has amounted to anything at all."

"How much experience have these men had with these rifles before they go over?" asked Senator Hitchcock.

"Quite sufficient."

"Are there not hundreds of thousands without rifles?"

"No, sir; there are many, but not hundreds of thousands who have no rifles."

Discovery of the Bureau

General Crozier then described to the committee the discovery made by the Ordnance Bureau when the modified Enfield rifles began to be delivered that, owing to inadequate standardization of gages, there was only a slight degree of interchangeability between the rifles made in the three plants.

The three factories, he said, manufactured independently of each other and we found that the parts of the rifles could only be slightly used interchangeably. That, of course, is very undesirable. Parts of rifles are continually giving way in service, getting broken or lost, and the subject of spare parts is a manufacturing problem of the first importance. Now if we had three makes of modified Enfield rifles in the theater of war requiring three different sets of spare parts dependent upon the factory from which the rifles came, you can see what an unfortunate situation would have been produced. It therefore became necessary to make these rifles interchangeable, and that involved changes in drawings and in gages. Considering the magnitude of the task, I think those changes were made in a remarkably short time. We succeeded in having standardized rifles turned out in the month of August from one of the factories.

Now, with reference to what could be done with the troops in the meantime. We had on hand a very considerable proportion of the rifles necessary for arming the regular army and the National Guard using only the standard Springfield model of 1903. We know it would be necessary that the first troops sent abroad should be from those two contingents, and they have been. This gave us a certain

amount of time to prepare for equipping the National Army. There were for this purpose something like 160,000 Krag-Jorgensen rifles, which are very good rifles, not so good as the Springfield or the modified Enfield, but entirely serviceable. They were available for training the troops of the National Army and we had ready to ship as soon as the force was called out, and did ship before it had all reported, some 5000 of these Krag-Jorgensen rifles to each of the cantonments of the National Army. Those were followed in a few weeks by 2500 more and soon after by another 2500, so that there are now about 10,000 Krag-Jorgensen rifles at each one of the National Army cantonments. Inasmuch as there are only about 14,000 infantrymen in each division and a few cavalry and artillerymen armed with rifles, making their requirement about 18,000 rifles for each division, we now have in each cantonment practically one rifle for each two men, or ample for drilling purposes. In addition there are now on their way to cantonments 11,000 of the Enfields for each.

It is true that at first a number of the men in the cantonments did not have anything but wooden rifles. That was corrected promptly, however, and the shortage of rifles has not made and will not make any difference in the time in which an effective army of trained soldiers can be gotten to the theater of war, unless we greatly enlarge the army beyond what is now contemplated. Of course, some 10,000,000 men have been registered under the draft law. By a stroke of the pen those men can be called into the service, and by doing it with sufficient rapidity you can throw your supply of rifles or any other kind of equipment as far back as you like, but so far as the present plans for calling men in the service are concerned, there will be no delay in their effective use on account of rifles.

Plenty of Target Practice

General Crozier added that while it had not been deemed advisable to manufacture or use obsolete ammunition for target practice with the Krag-Jorgensen rifles, yet ample opportunity would be afforded the men in cantonments for target practice with the Enfield rifle and ammunition already shipped.

At this juncture it became apparent that many members of the committee were laboring under the misapprehension that the troops now in France had been taken from the cantonments after insufficient training and with practically no target practice.

"Is it not a fact," asked Chairman Chamberlain, "that many of these troops that were taken from the cantonments to be mobilized in France had to go without more than two or three weeks' training with guns?"

"The troops which thus far have gone to France," replied General Crozier, "and those which will for some time go are those of the regular army and the National Guard and they all have Springfield rifles and have had adequate opportunity for target practice."

"Do you mean to say," insisted the chairman, "that men are not being sent to France who have not had more than six weeks' training with ammunition and rifles at target practice and bayonet practice and all the exercises that go to make a soldier?"

"There are no troops being sent to France," replied General Crozier, "who have not had for some time the rifles they have been using. There has been some shortage of ammunition, but they have had target practice."

Referring to a statement made by General Crozier that certain of the rifle contractors permitted their organizations to "taper off" after completing their British contracts and before they were in position to begin the manufacture of rifles for the United States with the desired degree of interchangeability, Senator Weeks asked if there had not been "gross neglect on the part of someone in allowing the organization to become reduced, knowing that the United States was at war." General Crozier replied:

To have kept the organizations at full strength would have necessitated carrying a large number of men on the payrolls with nothing to do and someone would have had to pay out a great deal of money for it. We did that to a certain extent and we have been very severely criticized for it. I am, however, perfectly willing to support that criticism. During the interval while the manufacture of the British rifle was being reduced to nothing and the manufacture of ours was beginning there were times when we were not able to keep employed the men who were at the factories, important men including inspectors and other classes

of men who were indispensable to us, and we paid the necessary money to keep those men at the factories in order that the organizations should not be disintegrated. Everything of this sort has to be measured by what is advisable and in the light of the situation that we are now in. I am firmly of the opinion that if we had sacrificed any of the advantageous elements that we have retained for the sake of a more rapid delivery of rifles, we would have made a serious mistake.

Concerning the manner in which the modification of the Enfield rifle and all the associated problems were decided upon, General Crozier said that all the matters in question were determined at a conference between the Secretary of War, the chief of staff, the commander of the American Expeditionary Force, the chief of the War College division of the general staff, the commandant of marines, who had a force in the expedition, and himself. He also emphasized the fact that the decision to use the Springfield ammunition only had an important bearing upon the machine gun question for the reason that that gun uses the same ammunition as the rifle. This, he said, made it additionally important to employ only the one kind of ammunition.

Machine Guns Discussed

The committee then took up the subject of machine guns, General Crozier testifying that in placing orders for such guns in factories that had been making them for the British, it was necessary to modify their equipment in order that the guns turned out might fit the Springfield ammunition. Such delay, however, was compensated for by the fact that other factories which were making guns using our ammunition were enabled to proceed rapidly.

General Crozier gave some interesting details concerning the Government's plan for the production of machine guns, stating that the Lewis gun now being made by the Savage Arms Co. of Utica, N. Y., was being turned out at a maximum rate of 500 per month, while the Vickers gun was also being produced at the Colt factory in satisfactory quantities. A considerable number of Colt guns manufactured by the Marlin company have also been purchased and are being used for training purposes here. He admitted that a discussion of the relative merits of the Lewis and Vickers guns had caused some delay, but said some time was also consumed in testing the weapon finally adopted as the standard for service, the Browning gun, "the best gun in existence." The manufacture of the Browning gun, of both heavy and light types, both using the same ammunition, is now proceeding on a large scale.

General Crozier was subjected to a very severe cross-examination concerning the delays in the adoption of standard types of machine guns and especially as to why the United States had refused to adopt the Lewis gun, which appears to have made such an excellent record abroad. In explanation of the fact that the Lewis gun was not adopted early in the war preparations, General Crozier said that it was presented for test to several boards composed of officers representing various branches of the Department and including but a single officer of the Ordnance Bureau and was uniformly rejected, the rejection being based, in his opinion, upon the fact that the guns were lighter and not so well made in the factories in this country as in England. More recently, he said, the manufacture of the Lewis gun in the United States has been perfected to such an extent that it is now equal to the weapon as made in England and the department has purchased a large number.

Secretary of War Responsible

Concerning the delay in selecting a type of machine gun for quantity production, General Crozier said it grew out of the decision of the Department in the fall of 1916 to allow time for all machine gun inventors and manufacturers to perfect their guns and submit them for a competitive test in the spring of 1917.

At this point the following colloquy ensued:

The Chairman: The Ordnance Department then realizes the importance and the necessity of the machine guns?

General Crozier: Yes, sir.

The Chairman: Because they have been utilized generally along the French and German front?

General Crozier: Yes, sir.

The Chairman: And yet between the appropriations of 1916 and June, 1917, practically nothing was done toward construction. I still am not satisfied with the explanation you made about the delay.

General Crozier: Senator, what I shall have to say to you then is that I am not satisfied, either, and I was not satisfied at the time.

The Chairman: Who was responsible?

General Crozier: The Secretary of War.

The Chairman: Somebody is responsible, and I want to find out who.

General Crozier: The Secretary of War has to be responsible. That is to say, the program of treatment of the subject of machine guns, coming finally to the test of May, 1917, was a program which was adopted by the War Department; it was prescribed by the Secretary of War, who took a personal interest in the subject, and was not the program of the Ordnance Department.

Replying to questions by the committee, General Crozier described in detail the various machine guns now in use abroad and repeated his opinion that the Browning gun now under manufacture is the best machine gun yet devised.

"I think it is time," he said, "to say something which I have not told the committee before in reference to these machine guns. The number in our possession was so small and the possibility of manufacture in this country was so limited that when our troops went abroad we were fortunately able to make the same kind of an arrangement with the French Government with reference to the machine guns that we had made with reference to artillery, and we are getting from them quite a sufficient number of guns to arm our troops over there of the Hotchkiss type of heavy guns and the Chauchat type of light guns. We are also securing from the French ample supplies of French ammunition for use in those guns and we are also manufacturing the same kind of ammunition over here. This would appear to be a disadvantage, but the guns which the French will manufacture for us hereafter will use our own ammunition and in a short time the use of the French ammunition will be discontinued. Furthermore, some of these Chauchat guns have been sent over here and we are making ammunition for them and they are in the hands of our troops for training."

Replying to a question as to whether the Browning gun could be manufactured in the United States in sufficient quantity to equip the army, General Crozier said:

That gun was brought out by the Colt company, which owns the patents. Mr. Browning was in their employ when he invented it and it was developed at their expense. The Colt factory has been making preparations for its manufacture for some time. They are enlarging their factory at Hartford, Conn., and they have bought another factory from the New England Westinghouse company, which had been used for the manufacture of Russian rifles and which has considerable machinery available for making the machine guns, in addition to which the Winchester Arms Co. of New Haven is also preparing to manufacture the Browning gun, having a plant suitable for the purpose. Also the Remington-Union Metallic Cartridge Co. of Bridgeport is preparing to manufacture these guns, having a plant available. There is also a plant at Norwich, Conn., that used to belong to the Hopkins company, which has been taken over by the Marlin company, where they are now completing the manufacture of some Belgian rifles, and they also have in preparation two other plants where tools and fixtures are being made for the manufacture of the Browning gun. Finally, we are in negotiation for the manufacture of Browning guns in still another factory which is not yet free because it is engaged in manufacturing for the Allies, which takes up its capacity.

I would not have you gather that all our eggs are in one basket, even in reference to the Browning gun. We have the Vickers gun, which is being manufactured and in regard to which we are giving orders to occupy all the capacity which the Colt people have, and we have recently called upon them to increase it.

For an army of a million men we ought to have 70,000 or 80,000 machine guns of the light and heavy type combined. An infantry division as we have it organized is composed of about 20,000 troops with some 224 guns of the heavy type and something like 600 or 700 of the lighter type.

Concerning the Browning gun, General Crozier said that deliveries in quantity would be made in April and

that in the meantime the army going to France would rely upon the French Chauchat gun and the Lewis gun.

Experience of European Nations

In conclusion, General Crozier, speaking of the experience of the European nations in getting ready for war, said:

"This past summer, for the first time, the French and English really got ready to supplement the initial equipment for the war and succeeded in obtaining a fair manufacturing capacity. They started in the summer of 1914 with nothing; neither an army nor its equipment. In 1915, they had an army without equipment; in 1916, an army only fairly equipped, and it was not until last spring that they obtained full equipment. This was true of both England and France. As for the Germans, they started out fully equipped; they had more than anybody else, but they have also increased both the number of machine guns and the amount of artillery, and particularly the amount of artillery ammunition. All the nations ran short of artillery ammunition the first autumn of the war. The French and English ran shorter than the Germans, and the English very much shorter than the French. The Germans had manufacturing organized so that they were able to make up the artillery shortage very much better in the winter of 1914-15 than the others did, but nevertheless they had to make up a shortage. They all underestimated the amount of artillery and artillery ammunition to be used in the war."

W. L. C.

LARGE TOOLS SCARCE

Government Assistance for Manufacturers Is Advocated

P. M. Brotherhood, vice-president of Manning, Maxwell & Moore, Inc., New York, in a letter addressed to Secretary of War Baker, Secretary of the Navy Daniels and the Council of National Defense, calls attention to the great scarcity of large machine tools, and points out that this scarcity will continue throughout the first half of 1918, at least, thereby greatly handicapping the war plans of the United States Government. Shipyards, navy yards and arsenals are the great sufferers from the shortage. Mr. Brotherhood advises the Government to consider a solution, and suggests financial aid for manufacturers who are in a position to make such equipment. He says in part:

We are afraid that unless some action is taken along the lines which we have indicated the Government will find very soon that they cannot get 25 per cent of what is needed. In fact, that is the condition to-day; we are unable to obtain or supply more than about 25 per cent of what is being called for, and the situation is not improving; and the result is that ridiculous prices are being paid for second-hand machines of very old, obsolete designs. We have been producing and selling all kinds of machinery for over 30 years, and have never seen the situation so bad as it is to-day, and at a time when speed is most essential. Our own plant, the Putnam Machinery Company, at Fitchburg, Mass., is at the present time sold out until next August. Ninety-five per cent of the work is Government work. Our Shaw crane plant at Muskegon, Mich., is also about in the same condition. The outlook at this time for getting large tools is most decidedly discouraging. A great many of the Government contractors are up against it, being unable to get the machinery required. Other parties who could help out are discouraged, and are refraining from attempting to undertake contracts, knowing the difficulty they have had in getting the necessary machine tools.

M. Braibant, who was formerly in the iron and steel business in Brussels, and recently has been importing British iron and steel goods into France, desires now to secure some connections with export merchants of iron and steel in New York, Philadelphia and Boston, the French government having taken over the importation of merchandise of the character which he has been undertaking. He is located at 28 Rue Pauquet, Paris (16), France.

Machinery Markets and News of the Works

WAR BUYING LARGE IN WEST

Chicago and Cleveland Markets Active

New Inquiry in the East Shows a Decided Falling Off, Partly Attributable to Approaching Holiday Period

Though the volume of new inquiry in New York and Philadelphia shows a decided falling off, which is attributed in some quarters to the approaching holidays and the coming of a new year, also to the fact that many war plants have satisfied their immediate requirements, new buying in the Central West, particularly in Cleveland, continues on a large scale.

The past week in Cleveland was one of the busiest of the year, both in the volume of business placed and in new inquiries received. The demand is principally for lathes, planers, radial drills, boring machines and milling machines in large sizes.

The Templars Motor Corporation, Cleveland, which has taken a shell contract, has placed orders for about 80 machines, mostly lathes, involving about \$200,000. Dodge Brothers, Detroit, have been buying heavily for their new plant which will make recoil mechanisms for heavy guns. The Erie Forge Co., Erie, Pa., has placed additional orders. The Willys-Overland Co., Toledo, Ohio, is arranging to largely increase its facilities for Government work and will buy probably \$500,000 worth of lathes, boring mills, planers and milling machines. The Morgan Engineering Co., Alliance, Ohio, which has taken a large order for gun carriages, is asking for about 100 lathes. Its requirements are said to total about 400 tools. A. R. Pribil, 602 American Trust Building, Cleveland, is organizing a company to make pressed steel connecting rods and pistons for automobiles and airplanes, and considerable machinery will be bought.

In Chicago, the Western Electric Co., St. Louis, has placed large orders for equipment to make 6-in. shells. The Standard Steel Car Co., Hammond, Ind., understood to have a large contract for howitzer mounts, has issued a large list. The Nash Motors Co., Kenosha, Wis., is buying against a small list.

Buying in Eastern markets is principally for such Government projects as the ordnance base depot in France, the arsenals at Watertown, Mass., and Watervliet, N. Y., and the new shops being built at the Washington Navy Yard. Companies making hydraulic and ball bearing jacks are inquiring for new equipment, it being probable that the Ordnance Department of the Army will soon award several contracts for jacks of one type or the other for use with heavy artillery. Valve manufacturers have been buying because of contracts received for supplying valves for submarine destroyers.

The labor situation is reported better in some sections. Two machine-tool plants in Cleveland have large stocks on hand and have released several hundred me-

chanics, who have gone to other machine-tool factories. One Cleveland company has augmented its force by 200 men from this source.

New York

NEW YORK, Dec. 18.

Machine-tool demand here is at the lowest ebb in several months. Not only are there few large inquiries from war plants, but the number of miscellaneous small-lot inquiries has shown a marked falling off in the past week. This decline in business is attributed partially to the fact that many of the large war plants have satisfied their requirements for the time being, and also to the approach of the holidays and the new year. Many companies are believed to be postponing purchases until after Jan. 1 for financial reasons.

Several dealers in Eastern territory are giving almost their whole time and the time of their salesmen to problems of transportation of the machines already on order. Some of them are glad of the present lull in buying to close up the year's affairs during the next two weeks.

The labor situation shows improvement. Two machine-tool manufacturers in the Cleveland district are reported to have large stocks of certain small-sized tools and have released many of their mechanics for work in other machine-tool plants, where they are more seriously needed to get out war orders. One company has increased its force by 200 men from this source.

The Stone & Webster Engineering Corporation continues to buy tools for the ordnance base depot to be built for the American army in France. The Washington Navy Yard is buying for its new shops and the Watertown and Watervliet arsenals continue to buy for their gun-making shops.

The Standard Thermometer Co., New York, has bought a few tools for work on a contract for gun sights. The Peerless Printing Press Co., Palmyra, N. Y., is reported to have received a similar contract.

The American Can Co. has not yet bought equipment for its Edgewater, N. J., plant for a recent shell contract. About 150 tools will be required.

Dodge Brothers, Detroit, have obtained more tools in New York for their new plant in Detroit to be devoted to the manufacture of recoil mechanisms for big guns. The tools they got were taken from export warehouses.

The Navy Department has given out several new contracts for the manufacture of valves for submarine destroyers, and the companies receiving such contracts have been buying a few tools. Contracts are about to be awarded by the Ordnance Department of the army for either hydraulic or ball bearing jacks for heavy guns. Companies making this equipment have been inquiring for tools.

The demand for cranes is smaller than for some time past. The Federal Shipbuilding Co. has closed for 10 cranes for its shops, a part of this order going to the Northern Engineering Co., Detroit. A list of 11 more shop cranes is still pending.

Machine-tool manufacturers are having some trouble in obtaining shipments of raw materials. The case is cited of a manufacturer whose shops are filled with A1 priority orders applying to Washington for an A1 priority certificate for the shipment of coal, steel, etc., needed in its plant. The certificate it received was A4. An appeal was again made to Washington, the company maintaining that it could not possibly keep up its shipments of machine tools as per schedule unless the Government gave it first classification on stocks of raw materials.

Louis Leavitt, 454 Driggs Ave., Brooklyn, operating a white lead works, has awarded contract for a three-story brick addition, 100 x 125 ft., to cost \$70,000.

The United Metal Spinning Co., New York, has been incorporated, with capital of \$40,000, by J. F. Forrester, L. Seitz and W. O. Langley, 346 Broadway.

The Columbia Graphophone Co., Woolworth Building, New York, a West Virginia corporation, has reincorporated in Delaware with a capital of \$30,000,000.

John Chatillon & Sons, 85 Cliff Street, New York, manufacturers of scales, etc., have increased their capital from \$200,000 to \$300,000.

The Washburn Wire Co., foot of 118th Street, New York,

has filed plans for rebuilding its five and nine-story factory building, recently destroyed by fire. The work will cost about \$350,000.

The Eastern Tool & Machine Co., New York, has been incorporated, with a capital of \$10,000, to manufacture tools. S. R. and E. F. Hills and C. A. Fisk, 656 Southern Boulevard, are the incorporators.

The Bureau of Yards and Docks, Navy Department, Washington, has awarded a contract for the erection of a ship construction building at the Brooklyn Navy Yard to cost \$310,000. The Jarrett-Chambers Co., 30 East Forty-second Street, New York, is the contractor.

Arthur W. Liebers, Inc., has been incorporated, with a capital of \$25,000, to manufacture motors, engines, etc. M. M. Helfgot and Arthur W. Liebers, 1914 Bleecker Street, Brooklyn, are the incorporators.

Olsen & Maggraf, Inc., has been incorporated by C. W. Oschmann, O. C. Maggaff and A. C. Olsen, 216 Eighty-eighth Street, Brooklyn, with a capital of \$10,000, to manufacture metal ceilings, etc.

The Hotchkiss Machine Co., New York, has been incorporated, with a capital of \$25,000, to operate a machine shop. W. Grundhoefer and N. and S. H. Lewis, 15 West Sixtieth Street, are the incorporators.

Thomas Paulson & Son, Inc., 97 Second Avenue, Brooklyn, operating a brass foundry, is taking bids for a two-story extension 35 x 60 ft.

The Eastern Flexible Conduit Co., 41-59 Gardner Avenue, Brooklyn, manufacturer of flexible electrical conduits, etc., has increased its capital from \$50,000 to \$150,000.

The Larabee-Deyo Motor Truck Co., 226 West Fifty-second Street, New York, has increased its capital from \$80,000 to \$300,000.

The Gas Engine & Power Co., 177th Street, New York, will build a blacksmith shop addition, 22 x 65 ft., for forging work.

The American Pipe Bending Machine Co. has been incorporated, with a capital of \$10,000, by J. W. Ashton, G. W. Graham and H. Van Wyck, 1883 Southern Boulevard, Bronx.

The Utility Machine Appliance Co., New York, has been incorporated, with a capital of \$10,000, to manufacture specialties. G. F. Woolston, R. J. Walsh and E. E. Haines, 45 West Thirty-fourth Street, are the incorporators.

The Government has taken over the plant of the General Vehicle Co., Starr Avenue, Long Island City, and will devote it to the manufacture of airplane motors. It has also taken over the plant of the Warner Speedometer Co., Jackson Avenue, Long Island City.

The American Fuel Machine Corporation, New York, has been incorporated in Delaware, with a capital of \$500,000, to manufacture machinery for fuel handling, cutting, etc. George V. Reilly, Samuel B. Howard and Arthur W. Britton, 65 Cedar Street, New York, are the incorporators.

The S. Jackson Tube Co., Brooklyn, has been incorporated, with a capital of \$150,000, to manufacture tubing, etc. E. E. and S. Jackson, 650 East Twenty-second Street, Brooklyn, are the principal incorporators.

The High Speed Steel Products Corporation, New York, has been incorporated, with a capital of \$27,500, by A. F. McCabe, F. H. Butehorn and A. E. Moore, 37 Wall Street, to manufacture steel.

The Max Ams Machine Co., 372 Greenwich Street, New York, will erect a one-story brick machine shop, 42 x 140 ft., at Yonkers, N. Y., at a cost of \$20,000.

The McIntosh & Seymour Corporation, 149 Broadway, New York, manufacturer of engines, with plant at Auburn, has filed notice of reorganization, with a capital of \$2,310,000.

The Allen Cutlery Co., Newburgh, N. Y., has been incorporated with a capital of \$20,000 by R. and H. M. Allen and A. J. Fowler, Newburgh, to manufacture cutlery.

The Sanford Motor Truck Co., 107 St. Marks Avenue, Syracuse, N. Y., has had plans prepared for a one-story factory on West Fayette Street, 80 ft. square.

The Roseville Engineering & Machine Co., Newark, N. J., has filed notice of organization to operate a works at 98 Thirteenth Avenue. John M. Okinanski, 17 Hill Street, and Charles Simon, 55 Fifth Street, head the company.

A one-story machine shop, 30 x 50 ft., will be erected on Boyden Street, Newark, N. J., by the Bonnell Motor Car Co., 520 Broad Street, in connection with its new automobile service station to be constructed at Sussex Avenue, Boyden and Sheffield streets, at a total estimated cost of \$100,000.

The Universal Compound Co., 428 West Twenty-fifth Street, New York, manufacturer of roofing specialties, has

acquired a four-story factory, 50 x 100 ft., at Mott Street and Passaic Avenue, Newark, N. J., for a new works.

The American Standard Metal Products Co., Jersey City, N. J., has been incorporated with a capital of \$1,000,000 to manufacture metal goods. Howard Brooke, E. B. Cadwell and John H. Wynne, all of Jersey City, are the incorporators.

Improvements in the power plant at its works on Washington Street, Jersey City, N. J., will be made by the American Sugar Refining Co., at a cost of about \$10,000.

The Standard Electric Mfg. Co., Jersey City, N. J., has been incorporated with a capital of \$200,000 by Jules E. Brand, H. A. Black and Walter T. Hilton, all of Jersey City.

The Armstrong Rubber Co., Washington Street, Hoboken, N. J., has increased its capital from \$200,000 to \$1,500,000.

John Campbell & Co., Newark, N. J., manufacturer of bookbinders' materials, will build a one-story machine shop, 25 x 80 ft., at its plant on Plum Point Lane.

Turton Brothers, Newark, N. J., have filed notice of organization to operate a works for steel die specialties at 44 Hill Street. William Turton, 15 Ninth Avenue, East Orange, heads the company.

The DeMeese Welding & Mfg. Co., Newark, N. J., has been incorporated with a capital of \$25,000 by Frederick DeMeese and Samuel Wollman, Newark.

The August Buermann Mfg. Co., 220 Jelliff Avenue, Newark, N. J., manufacturer of hardware, will build a one-story addition to its foundry, 52 x 57 ft., to cost about \$7,000.

Buffalo

BUFFALO, Dec. 17.

The Symington Forge Co., Rochester, will build a one-story machine shop, 175 x 342 ft., on University Avenue.

The Linde Air Products, 155 Chandler Street, Buffalo, has purchased a site, 230 x 370 ft., at the New York Central Railroad and Broadway, on which it will build a plant for the manufacture of oxygen.

Otto P. Weisswange, Inc., Mt. Vernon, N. Y., has been organized with a capital of \$50,000 to manufacture precision thermometers and other scientific apparatus. M. Hertz, H. Weissman and E. K. Noll, 44 Court Street, Brooklyn, are among the incorporators.

The General Abrasives Co., Niagara Falls, N. Y., is building an addition to its plant on College Avenue.

The Willys-Morrow Co., Elmira, N. Y., John E. Willys, president, is having plans prepared for an assembling building, 120 x 212 ft., and a one-story testing building, 56 x 321 ft., to cost \$60,000.

The Sanford Motor Truck Co., Syracuse, N. Y., J. F. Durston, president, is having plans drawn for a factory 80 x 80 ft. on West Fayette Street.

The Oldman Boiler Works, 36 Illinois Street, Buffalo, will build a two-story addition, 50 x 100 ft.

The National Wire Wheel Works, Geneva, N. Y., has increased its capital from \$350,000 to \$1,000,000.

New England

BOSTON, Dec. 17.

Little of news interest has occurred in the machine-tool industry of New England the past week. Orders continue to pour in from every quarter and local plants are adding a machine here and there to replace old machines or to balance up equipment. Priority has become almost meaningless, as nearly everything now ordered is on a priority basis. One good effect of this is that machine-tool plants are enabled to plan their production schedules to match their equipment and labor force and the net result is a greater output than would be possible if they were compelled to concentrate on one or two sizes or kinds of machines.

The Simonds Mfg. Co., Fitchburg, Mass., has awarded a contract for an addition, 73 x 180 ft., one story.

The Crompton & Knowles Loom Works, Providence, R. I., is building a one-story addition.

The Wholley Boiler Works, Providence, R. I., has been incorporated with authorized capital stock of \$50,000.

The Osgood Bradley Car Co., Worcester, Mass., is to build a forge shop addition, 30 x 60 ft., one story.

The Nelson Rivet Co., Raynham, Mass., has been incorporated with authorized capital stock of \$10,000. Arthur E. Nelson is president and Walter H. Nelson, Taunton, treasurer.

The Ludington Machine Co., Waterbury, Conn., has awarded contract for an addition, 42 x 112 ft., three stories.

The Franklin Foundry Co., Franklin, Mass., has been incorporated with authorized capital stock of \$10,000. Carl E. Erickson is president and Patrick H. Gibbons, Hyde Park treasurer.

The General Electric Co. is to build a one-story foundry at its Everett, Mass., plant at a cost of \$35,000.

The F. A. Buck Co., Eastport, Me., is beginning the erection of a machine shop, 53 x 63 x 78 ft., and 57 x 78 ft., two stories. The work will not be completed until next summer.

The American Buckle Co., West Haven, Conn., is building an addition, 40 x 60 ft., two stories.

The S. H. Barnum Co., New Haven, Conn., has awarded contract for an addition to its foundry, 40 x 58 ft.

The Cushman Chuck Co., Hartford, Conn., is asking bids on an addition, 90 x 115 ft., one story.

The New Britain Machine Co., New Britain, Conn., has issued \$250,000 additional stock, making outstanding stock \$1,250,000.

The John Davenport Co., Stamford, Conn., contemplates the erection of a factory 90 x 300 ft. The new company will combine the Ross Engineering Co., Bridgeport, Conn., and the Steinmetz Electric Truck Co., Newark, N. J. The company will manufacture gasoline engines and electric trucks.

Landers, Frary & Clark, New Britain, Conn., have awarded contracts for two additions, 62 x 155 ft., three stories, and 32 x 82 ft., one story.

Philadelphia

PHILADELPHIA, Dec. 17.

The Lanston Monotype Machine Co., Twenty-fourth and Locust streets, Philadelphia, has filed plans for a one-story, concrete addition, to cost \$20,000.

The Automatic Shell-Boring Munitions Co., Philadelphia, has been incorporated with a capital of \$100,000 by Samuel Hough, Cyrus Hawkins and Russell H. Myers, Philadelphia.

The William Cramp & Sons Ship & Engine Building Co., Beach Street, Philadelphia, has awarded a contract for a one-story addition to its brass foundry at Adams and Thompson streets, 140 x 220 ft., to cost \$40,000.

Hare & Chase, Inc., Philadelphia, has been incorporated in Delaware with a capital of \$1,000,000 to manufacture automobiles and automobile specialties. F. R. Hansell, Philadelphia, and S. C. Seymour, Camden, N. J., are the incorporators.

The Bureau of Yards and Docks, Navy Department, Washington, has taken bids for one-story additions, 40 x 160 ft., and 25 x 48 ft., to its magazine works at Fort Mifflin, Pa.

The New York Shipbuilding Corporation, Camden, N. J., has had plans prepared for a one-story addition, 50 x 130 ft., for a galvanizing works. It is also planning for a one-story plate rolling mill.

Fire Dec. 14 destroyed a portion of the car barns and shop of the Trenton & Mercer County Traction Corporation, Trenton, N. J., on Lalor Street, with an estimated loss of \$70,000.

The Horn & Brannen Mfg. Co., Trenton, N. J., has been incorporated with a capital of \$60,000 by Henry Donohoe, Herman Corn and Frederick Pfeffer, all of Philadelphia, to manufacture gas and electric fixtures, etc.

The American Steel & Wire Co., Trenton, N. J., is building a one-story machine shop, 70 x 210 ft., and a wire rope shop, 170 x 310 ft.

The York Hardware & Brass Works, Wheatfield and Commerce streets, York, Pa., has acquired the former car shops of Billmeyer & Small, to be used for extending its operations, adding about 25,000 sq. ft. of floor area. It will be equipped as a bronze and aluminum foundry. It is said the extension will be put in operation early next year and will give employment to about 50 molders.

The Berks Engineering Co., Reading, Pa., operating a machine shop at Seventh and Chestnut streets, has increased its capital from \$25,000 to \$150,000.

Baltimore

BALTIMORE, Dec. 17.

The Bureau of Yards and Docks, Navy Department, Washington, has awarded contract for a one-story brass foundry, 107 x 300 ft., at the Washington Navy Yard to cost \$255,000.

Fire Dec. 12 destroyed a portion of the projectile-loading

plant of the Bethlehem Steel Co., at New Castle, Del., with loss reported at \$75,000.

Fire Dec. 14 destroyed a section of the plant of the du Pont Powder Co., Newark, Del., with loss estimated at \$100,000.

The American Shipbuilding Corporation, Alexandria, Va., has been incorporated with a capital of \$10,000,000 by C. H. Livingston, 1249 Kenyon Street, N. W., Washington, president; B. W. Morse is vice-president.

The Huntington Steel Products Co., Huntington, W. Va., is reported considering the enlargement of its plant.

The Bartlett-Hayward Co., Scott and McHenry streets, Baltimore, will construct a one-story addition, 40 x 49 ft., to cost \$8,000.

The Harlan branch of the Bethlehem Steel Co., Wilmington, Del., will build an additional shop at the foot of West Street to cost \$4,000.

Chicago

CHICAGO, Dec. 17.

War business of considerable proportions has been placed or is pending, but the market has nevertheless shown a quieter trend the past week. In ordinary times dullness might well be expected about this time of the year. Some concern is shown over the extent to which collections are slowing up, this being especially true in the automobile industry. A feeling that resources should be conserved to the limit is general. Conflict in priority orders continues to occur, some of it due to the fact that the Army and Navy departments, in some instances, are after the same machines.

The Wagner Electric Co., St. Louis, has placed large orders for equipment required in the manufacture of 6-in. shells, the machines including many lathes of special design for shell work, on which delivery has been promised in 45 days.

The Standard Steel Car Co., Hammond, Ind., understood to have a contract for howitzer mounts, has issued a big list, and later on will want a still larger number of tools. Among its requirements are a number of vertical boring and turning mills, orders for some of which have been placed. Deliveries on this type of machine are in bad shape. With some makers, boring mills cannot be delivered until next summer or fall.

The Nash Motors Co., Kenosha, Wis., is buying against a small miscellaneous list.

James L. Sparks, brass founder, 320 West Grand Avenue, Chicago, has had plans prepared for a one-story brick brass foundry at 1723 Carroll Avenue, to cost \$12,000.

The William Glader Machine Works, 210 Ann Street, Chicago, has awarded the contract for a one-story machine shop, with foundation and walls to carry two additional stories, at Ann and West Lake streets, Chicago, to cost \$20,000.

The Abraham Lund Co., 19 South La Salle Street, Chicago, has been awarded the general contract for a one-story factory, 87 x 250 ft., to cost \$30,000, in connection with a plant at Waller Avenue and Taylor Street, Chicago, for the Hughes Electric Heating Co., 5660 Taylor Street.

The Witherspoon Englar Co., 53 West Jackson Boulevard, Chicago, has the general contract for a five-story macaroni factory, 85 x 120 ft., to cost \$500,000 with equipment, for the Armour Grain Co., Battle Creek, Mich. Hydraulic presses are used in the manufacture of macaroni.

Plans are to be prepared by Robert R. Cenek, architect, 105 South La Salle Street, Chicago, for a factory at Grand and Kildare avenues, for the Ocean Floating Co., 803 West Madison Street, Chicago.

The J. G. Redmond Millwork Co., Rockford, Ill., has been incorporated with a capital stock of \$15,000 for the manufacture of planing-mill machinery. Among the incorporators is J. G. Redmond, who now operates a small factory in Rockford.

The Grand Rapids Airplane Co., Grand Rapids, Mich., has been organized to distribute wooden parts of aeroplanes and to operate a factory for building such parts as require special machinery. S. D. Young was elected president, F. S. Foote vice-president, and J. H. Hoult treasurer. Thirteen furniture manufacturers are stockholders in the company, the capital stock of which will be \$200,000.

It is announced that the General Motors Co. will reopen its plant in Marquette, Mich., Jan. 1 and employ between 1000 and 1200 men. The plant, originally built for the Rainier Motor Car Co., has been idle for some time. It will be managed by George H. Hannum, also general manager of the Jackson-Church-Wilcox Co.

The Convertible Tractor Corporation, 1485 Marshall Avenue, St. Paul, Minn., is preparing plans for an addition,

50 x 115 ft., four stories. When completed it will increase its working force by about 150 men.

Milwaukee

MILWAUKEE, Dec. 17.

Orders for machine tools continue in large number, with no improvement looked for on deliveries. Bookings now in hand will occupy all available capacity for 12 months, and in some instances a year and a half.

A readjustment of labor now going on has created a much easier feeling than for many months. An official statement of local conditions is to the effect that the supply of mechanics, such as drill-press hands and punch-press operators, is rapidly becoming more adequate. There is a steady demand, however, for toolmakers, tool blacksmiths, drop-forged men, and all-around machinists, which is difficult to fill. The shortage of labor for outside work is especially acute, due largely to the time of year. The selective draft has worked much less hardship on metal-working shops than had been expected, and under the new system it is believed the shops will be protected to an even more adequate degree.

The Northwestern Motor Co., Eau Claire, Wis., manufacturer of heavy-duty gasoline engines, railroad tractors, maintenance cars, etc., is planning to erect a new plant estimated to cost about \$75,000 with equipment. It is affiliated with the Northwestern Steel & Iron Co., Eau Claire. Kim Rosholt is president of both companies. The motor company is far behind on orders, especially for a 45-hp. gasoline railroad tractor, and needs increased facilities immediately.

The Modern Steel Treating Co., Milwaukee, has been incorporated, with a capital stock of \$5,000, by George Haubert, president of the Crary Tool Co., 220 Becher Street. It will engage in heat-treating metals by a new process evolved by Mr. Haubert. G. Walter, Esau and Adam J. Eimermann are also incorporators.

The Sommers & Sons Co., Milwaukee, recently incorporated with an authorized capital stock of \$100,000, will manufacture tanks and other containers from non-corrosive metal. Members of the Sommers Mfg. Co., Detroit, Mich., are promoting the new company. The former plant of the General Construction Co., Thirtieth and Galena streets, Milwaukee, which has been taken over, is being remodeled, and will be ready shortly after Jan. 1.

The Southern Wisconsin Foundry Co., Madison, Wis., will start work immediately upon the construction and equipment of a new foundry to replace the one destroyed by fire Dec. 1, with an estimated loss of \$50,000. The company specializes in castings for machine tools. L. J. McGinnis is president and general manager.

The Badger Steel Roofing & Corrugating Co., LaCrosse, Wis., has changed its corporate style to the Badger Corrugating Co. E. N. Knothe is secretary.

The Minnesota Masterlock Co., Amery, Wis., has been incorporated, with a capital stock of \$10,000, by W. T. Kennedy, F. E. Yates and I. G. Ogden, to manufacture automobile locks and similar devices.

The Iola Light, Power & Mfg. Co., Iola, Wis., has been incorporated, with a capital stock of \$25,000, to conduct a hydroelectric and auxiliary steam-generating plant, saw and planing mill, and other industries. The incorporators are Edwin J., George, Bertha, and Erna Nehls.

The Christensen Machine Co., Racine, Wis., has increased its capital stock from \$5,000 to \$50,000, to provide for the extension of its shop and equipment.

The Monarch Auto Lock Co., Kenosha, Wis., has been incorporated, with a capital stock of \$100,000, to manufacture locks and other safety devices for automobiles and motor vehicles. The incorporators are Frank R. Hancock, Ronald F. Hoffman and Hans J. Kroch.

The Thor Machine Works Co., Racine, Wis., has been incorporated with a capital stock of \$20,000, by Knud F. Jacobson, Kai H. Stude and Andrew Astrey.

The John Lauson Mfg. Co., New Holstein, Wis., manufacturer of gasoline and oil engines and farm machinery, has increased its capital stock from \$500,000 to \$1,000,000, to develop its tractor manufacturing department.

The Silent Washer Mfg. Co., Clintonville, Wis., has completed its new plant and is transferring its machinery and equipment from the former factory at Appleton, Wis. G. W. Buttles is general manager.

The Porter Electric Line Co., Stebbinsville, Wis., has been incorporated, with a capital stock of \$10,000, to develop water power at Stebbinsville and furnish current to rural districts within a radius of 10 miles. Fred Miller is president.

The A. George Schulz Co., 417 Clybourn Street, Milwaukee, manufacturer of paper boxes and box board, has purchased a site of 9 acres in West Allis for its proposed new manufacturing plant, estimated to cost \$350,000. Work will probably not begin until the latter part of next year.

The Superior Shipbuilding Co., Superior, Wis., is adding three berths to its yards, making a total of seven. The company is now employing more than 800 men, and expects to increase this number to 1500 or 2000 within 90 or 90 days.

The Northwestern Ordnance Co., Madison, Wis., has practically completed its new machine shop and has commenced the installation of lathes and other machine tools required for the production of 4.7-in. field pieces for the Government. It is expected that operations will begin about Jan. 1. The shop adjoins the plant of the Gisholt Machine Co., which is financing the ordnance company.

The Wisconsin Duplex Auto Co., Clintonville, Wis., has completed the first models of its new 4-wheel-drive chassis in the plant of the Andrews Motor Mfg. Co., Milwaukee, and is contemplating locating its plant at Oshkosh. The company is capitalized at \$500,000, and was organized by William A. Besserich, one of the founders of the present Four Wheel Drive Auto Co., Clintonville.

Cleveland

CLEVELAND, Dec. 17.

The machinery market the past week has been one of the most active of the whole year in this territory, both in the volume of inquiry and in orders placed. A number of rounds lots of machines were purchased and numerous round-lot inquiries developed, all for Government work. The demand is principally for lathes, planers, radial drills and boring and milling machines in large sizes. The Templar-Motor Corporation, Cleveland, has taken a shell contract and placed orders with local machinery houses for about 80 machines, mostly lathes, and involving about \$200,000. Dodge Brothers, Detroit, who have been buying heavily for their Government plant to make recoil devices, have placed an additional order with a Cleveland machinery house for planers and lathes amounting to about \$60,000. The Erie Forge Co., Erie, Pa., which has been a heavy buyer of late, has placed an order for seven 60 to 72-in. lathes. The Willys-Overland Co., Toledo, is arranging to largely increase its facilities for Government work, and has come out with several inquiries, probably aggregating \$500,000 worth of lathes, boring mills, planers and milling machines. The Morgan Engineering Co., Alliance, Ohio, which recently took a large order for gun carriages, has finally placed contracts for extensive plant additions and is asking for about 100 lathes; also for radial drills, planers and boring and milling machines. It is reported that its total requirements for its new plant will be approximately 400 machine tools.

A. R. Pribil, formerly supervisor of the press department of the Westinghouse Electric & Mfg. Co., Pittsburgh and others, are organizing a company which will establish a plant in Cleveland for the manufacture of pressed steel connecting rods and pistons for automobiles and airplanes. It is the intention to either lease the factory building or to erect a new plant. Considerable machinery will be required, such as toolroom equipment and punch presses. Mr. Pribil has opened a temporary office at 602 American Trust Building.

The Wellman-Seaver-Morgan Co., Cleveland, which is building an addition to its Akron plant, will erect a power house, a galvanizing building and a crane runway.

The Brown Hoisting Machinery Co., Cleveland, will enlarge its plant by the erection of a one-story shipping building, 52 x 182 ft. The contract has been placed with the Austin Co., Cleveland.

The Morgan Engineering Co., Alliance, Ohio, has placed a contract with the George A. Fuller Co. for seven buildings for a new gun carriage plant, to be ready for occupancy about April 1. These will include an erecting shop 90 x 1000 ft. and six machine shops, 50 x 150 ft., 90 x 250 ft., 50 x 350 ft., 90 x 475 ft., 50 x 560 ft., and 90 x 200 ft. The Bethlehem Steel Co. will fabricate the steel for the buildings. On the completion of these buildings it intends to build others that will be practically a duplication of them.

The Scott-Fetzer Co., Cleveland, has been incorporated with a capital stock of \$100,000 and will succeed the G. H. Scott Machine Co., Noble Court, which has been conducted as a partnership by G. H. Scott and Carl Fetzer. Mr. Scott will be president, Mr. Fetzer vice-president and treasurer, and James Clark secretary. The company will occupy its new plant at West 114th Street and Locust Avenue about Jan. 1.

The International Steel Tube & Rolling Mills, Inc., Cleveland, which was organized about a year ago and ac-

quired a site in Warren, Ohio, to build a lap-weld mill for the manufacture of boiler tubes, expects to place contracts for its building within the next few weeks, but does not plan to purchase equipment for some time. C. H. Hopkins, 112 Guardian Building, Cleveland, is secretary and treasurer.

The National Malleable Casting Co., Cleveland, has placed contracts for the erection of a two-story \$60,000 welfare building for its new malleable iron foundry.

The Willys-Overland Co., Toledo, Ohio, will place its plant in full operation after Jan. 1, according to announcement by John M. Willys, president. This company has been making airplane motors, 3-in. gun carriages and army trucks for the Government, and is understood to have taken enough additional Government orders that, with its production of pleasure cars, will keep the plant at full capacity.

The Glenn L. Martin Co., Cleveland, recently organized to build airplanes, has moved from the Guardian Building to 310 Chestnut Avenue, where it has opened engineering offices. It is negotiating for a plant site.

The Odenkirk Mfg. Co., Cleveland, maker of water heaters, has purchased a site adjoining its present plant at 6811 Superior Avenue for a factory addition.

The Doehler Die Casting Co. is operating its Toledo, Ohio, plant with a large night and day force on Government work. This plant is reported to have a Government order for 20,000,000 parts for hand grenades.

The Kenney Foundry Co., Mansfield, Ohio, placed its new plant in operation a few days ago. This is located in remodeled buildings formerly occupied by the Phoenix Electric Co. The foundry occupies a floor space 50 x 100 ft. The company will do a jobbing business in gray-iron castings. It was recently incorporated, and its officers are: Andrew Kae, president; Joseph Paule, vice-president; J. M. Cousins, treasurer, and H. D. Kenney, secretary and general manager. Mr. Kenney was until recently general manager of the Humphreys Mfg. Co., manufacturer of sink backs, etc., Mansfield, Ohio.

The Lima Rivet & Forge Co., Lima, Ohio, has been incorporated with a capital stock of \$300,000 to manufacture a new design of rivet, invented by George B. Phillips, and to make forgings. A factory will probably be erected shortly. The incorporators include W. L. Russell, John M. Boose, H. S. Moulton and others.

A new brass foundry will be established in Warren, Ohio, in the former Day-Ward Co.'s plant by M. A. Garvey and L. J. Garvey of Sharon, Pa. Later it is the intention to erect a new plant. M. A. Garvey will be manager.

The new plant that is being erected in Orville, Ohio, by the Ohio Blower Co., Cleveland, is nearing completion, and it is expected that it will be placed in operation early in January. C. T. Klein will be manager.

The Woodard Machine Co., Wooster, Ohio, has shut down its foundry at Orville, Ohio, and is moving the equipment to Wooster, Ohio, where a new foundry will be placed in operation in a few days.

The Sandusky Foundry & Machine Co., Sandusky, Ohio, has acquired a site for a foundry addition adjoining its plant.

The Cornwall Mfg. Co., Cleveland, has increased its capital stock from \$10,000 to \$25,000 and will add to its equipment. It manufactures sheet metal specialties and operates a metal stamping department. R. W. Cornwall is president and J. P. McGinty is secretary.

Cincinnati

CINCINNATI, Dec. 17.

The fuel shortage has caused many manufacturers considerable inconvenience, but no plants in Cincinnati have been compelled to close down. Metal-working firms in Hamilton and Dayton have probably been affected to a greater extent.

Inquiries for machine tools for Government contracts are sent out in a more systematic manner, machine tool makers only receiving a list of tools which they build, and only dealers getting the full specifications covering the needs of different firms. Lately no large lists have been reported, but a Detroit firm is said to be preparing one to be issued shortly. Jobbing foundries that make a specialty of machine tool castings have been able to keep going, but the coke supply is running so short that operations may be suspended at any moment.

The Willys-Overland Co., Toledo, Ohio, has leased a manufacturing building at Richmond and Carr streets, Cincinnati, which will be equipped as an assembling plant.

The Ohio Welding & Mfg. Co., Cincinnati, has removed its plant from 814 West Sixth Street to the building formerly occupied by the William E. Gang Co. in West End. Augustin Dwyer, Jr., is president.

The Liberty Machine Tool Co., Hamilton, Ohio, has been incorporated with \$100,000 capital stock and will erect a plant in Lindenwald suburb for the manufacture of planing machines. The incorporators are Charles E. Heiser, A. Ballinger, Frank K. Vaughn, F. G. Mueller and A. R. McCann. Mr. McCann, who was formerly general superintendent of the Hamilton Machine Tool Co., will be general manager.

The Mosler Safe Co., Hamilton, Ohio, will erect an addition to its plant for which contract has been let to the Frank Vaughn Building Co.

The Dayton Bronze Bearing Co., Dayton, Ohio, has increased its capital stock from \$10,000 to \$30,000 and will erect an addition to its plant at 918 East Third Street.

The Recording & Computing Machines Co., Dayton, has acquired a site adjoining its plant on which it will erect an addition at an early date.

The Fluflo Pump Co., Cincinnati, has acquired five acres at Blanchester, Ohio, on the main line of the Baltimore & Ohio Railroad, on which it is erecting a two-story machine shop and foundry. By March 1 the company plans to reach a production of 500 small centrifugal pumps per day, and by midsummer it expects to double this. H. E. Henry is in charge.

The Dietz Mfg. Co., Cincinnati, has acquired a building at 230 Findley Street, which it will equip for the manufacture of a patented dish washing machine. The present offices are at 120 Opera Place.

The Ideal Machine & Tool Company, Cincinnati, for the past 15 years builder of special machinery, tools, dies and precision gages, has purchased at bankruptcy sale, all tools and machinery belonging to the New World Mfg. Co., of Cincinnati. It has also installed some new machinery, doubling its capacity to meet the growing demand for its combination precision lathe and grinder recently put on the market.

Indianapolis

INDIANAPOLIS, Dec. 17.

The Davis Foundry Co., New Castle, Ind., has been incorporated, with a \$40,000 capital stock, to do a general foundry and machine shop business. The directors are John G. Hey, Louis B. Patterson and William Davis.

Peck's Super Heat Co., Elkhart, Ind., has been incorporated, with \$10,000 capital stock, to manufacture automobile accessories. The directors are Raymond G. Peck, H. J. Rife and Carl E. Mishler.

The Greencastle Cabinet Works, Greencastle, Ind., has been sold to Grafton Johnson, Greenwood, Ind., and James B. Nelson, Indianapolis. It employs 150 men. R. R. Cunningham has been made general manager.

The Indiana Truck Corporation, Marion, Ind., will enlarge its plant to complete a contract for 500 motor trucks for the Government.

The directors of the Mutual Truck Co., Sullivan, Ind., have elected the following officers: President, Robert Petrie; vice-president, Roy Anderson; second vice-president, J. B. Miller; secretary, Frank McCoy, Effingham, Ill. The company will establish a plant in Sullivan.

The Chamber of Commerce, Laporte, Ind., announces that the New York Blower Co.'s plant at Bucyrus, Ohio, will be moved to Laporte and consolidated with another to be moved from Chicago.

The Central South

LOUISVILLE, Dec. 17.

Transportation has been the dominating feature the past week, traffic lines in this section having been badly crippled by severe weather. Coal mine equipment is sold for delivery from seven to nine months. Repair parts for machines are more in demand and shops in position to undertake repair work are operating to capacity. Coal is scarce and many plants have been on the verge of suspension.

Fire destroyed the sawmill, planing and veneer mill departments of the Louisville Planing Mill Co., Louisville, with a loss of \$65,000. The boilers and engine room were not damaged, but the wood-working equipment was lost.

The Roy C. Whayne Supply Co., Louisville, is in the market for a $\frac{1}{2}$ -yd. orange peel bucket in good condition.

A. T. Head, New York, and others are establishing an oil refinery at Rodimer, Ky., to have a daily capacity of 3000 bbl.

Fire destroyed the plant of the New Glasgow Flooring Co., Glasgow, Ky., operated by the J. O. Nessen Co., Chicago, with a loss of \$80,000. Curtis Harvey, Glasgow, may be addressed.

The W. J. Oliver Co., Knoxville, Tenn., is making addi-

tions to its plant at a cost of \$250,000 to manufacture 6-in. shells.

J. Ed. Guenther, Owensboro, Ky., implement dealer, is establishing a machinery exchange and is purchasing second-hand traction engine boilers, pumps and other machinery.

The Howard Shipyards & Dock Co., Jeffersonville, Ind., has reduced its capital stock from \$800,000 to \$400,000, and it is reported that it will build wooden ships. It has five yards on the Ohio River.

The Bates Mfg. Co., Lawrenceburg, Tenn., has been incorporated with capital stock of \$25,000 by W. H. Bates, H. L. Kincaid, S. Kelly, W. A. Hatman and T. C. King to manufacture automobile supplies.

R. S. Byron, Hennen Building, New Orleans, La., is asking for prices on one 125-hp. and one 54-in. boiler, locomotive type.

The Reciprocating Tool Co., Louisville, has been incorporated with a capital of \$10,000 by F. L. Robinson, James K. Jarvis and J. J. Roberts to manufacture electric tools.

The National Cast Iron Pipe & Foundry Co., Birmingham, Ala., has increased its capital from \$350,000 to \$500,000.

St. Louis

ST. LOUIS, Dec. 17.

The Littleton Brothers Co., Newport, Ark., are reported in the market for cotton gin and power plant equipment to replace that destroyed by fire with a loss of \$12,500.

E. D. Hardin, Kensett, Ark., under a municipal franchise, will equip an electric light and power plant.

The Green Light & Power Co., Pleasant Hill, Mo., has been incorporated with a capital stock of \$150,000 by L. K. Green, L. R. Green and others and will equip a plant.

Seminole, Okla., is in the market for about \$5,000 worth of electric plant equipment.

The Simplex Spreader Mfg. Co., Kansas City, Mo., is in the market for equipment for a plant to manufacture special agricultural implements for power and horse drawn use.

The Nowata Beginning & Producing Co., Nowata, Okla., has been incorporated with a capital stock of \$500,000 by Thomas E. Elliott, H. R. McGill and others, and is in the market for equipment.

The Iatt Lumber Co., Colfax, La., will rebuild its saw-mill recently burned with a loss of \$50,000 on equipment.

The Belfast Investment Co., Kansas City, Mo., W. S. Dickey and others interested, will equip a \$50,000 hay compressing plant.

The Frock Mfg. Co., Erick, Okla., has been incorporated with a capital stock of \$100,000 by John W. Heflin, F. F. Cain and others, and is in the market for metal-working machinery for the manufacture of yokes, etc.

The Louisiana Motor Car Co., Cedar Grove, La., has been organized with a capital stock of \$100,000 by J. S. Richardson, A. B. Pickett and R. E. Murff, all of Shreveport, La., to manufacture automobiles, trucks and farm tractors.

The Valley Motor Car Co., Clarksdale, Miss., has been incorporated with a capital stock of \$100,000 by its present owners and will enlarge its plant and add new equipment.

The Louisiana Shipbuilding Corporation, a reorganization of the Slidell Shipbuilding Co., Slidell, La., has been incorporated with a capital stock of \$1,500,000, and will increase its facilities to meet Government contracts.

Madill, Okla., A. A. Kelley, mayor, will expend \$65,000 on waterworks plant equipment, including considerable pumping machinery, etc.

The Excelsior Tool & Machine Co., engineer, founder and machinist, Thirtieth Street and Ridge Avenue, East St. Louis, Ill., plans to erect an addition to its foundry building and a two-story fireproof pattern shop, storehouse, stockroom and garage, and is seeking bids on building material. It is also planning to construct a large core oven, and will install a 10-ton and 2-ton electric crane. T. F. Philipp is president and manager.

The Akers Mfg. Co., Kansas City, Mo., has been incorporated with a capital of \$30,000 to manufacture metal specialties, brass castings, etc. H. H. Akers, A. A. and L. A. Buxton, Kansas City, are the incorporators.

The Henry Weis Mfg. Co., Kansas City, has been incorporated in New Jersey with capital of \$50,000 to manufacture metal goods. Henry Weis, Thomas H. Ridge and Robert Vance, Kansas City, are the incorporators.

Texas

AUSTIN, Dec. 15.

An increased demand for equipment for public utility plants is noted. A large amount of Government work which is also in progress throughout the State has added materially to the demand for small tools.

The Houston Shipbuilding Co., Houston, has leased a site on the ship channel for a plant. It will make a specialty of constructing ocean-going barges. Arthur Boyce, Dallas, is president.

The City Council, Mart, will install additional machinery in the municipal waterworks plant.

The San Augustine County Lumber Co., of Kelty's, which has increased its capital stock from \$200,000 to \$450,000, will enlarge its mills by the installation of additional machinery.

The City Council, Nacodoches, will install new equipment in the electric light plant with a view of doubling its capacity.

The Fort Worth Power & Light Co., Fort Worth, has increased its capital stock from \$3,860,000 to \$4,360,000, and will install a new 23,000 hp. steam turbine generator and other equipment in its power plant.

Fred A. Thackery, Sackaton, and associates will install an irrigation pumping plant near Florence, Ariz.

The East Texas Utilities Co., Marshall, which was recently incorporated with a capital stock of \$300,000, has taken over the electric light and power plants at Marshall, Jefferson and Longview, which it will enlarge and improve. The same interests have incorporated the West Texas Utilities Co. with a capital stock of \$400,000, with principal offices at Abilene, and have taken over the electric light and power plants of Abilene, Baird and Hamlin, where additional machinery will also be installed.

Captain Neilson and associates, Orange, have purchased a site of 37 acres on the Sabine River, upon which they will construct a shipbuilding plant.

W. L. Spence of El Paso will build a sawmill near Alamogordo, N. M., with a daily capacity of 15,000 ft.

The Hoffman Oil & Refining Co., Wilmington, Del., which has a capital stock of \$10,000,000, will establish offices in Houston and build a refinery for oil development operations in the Gulf coast fields.

The Port Arthur Cooperage Co., Port Arthur, will build a plant, to cost about \$100,000, for the manufacture of barrels and kegs.

The Texas Motor Car Association, Cleburne, has under consideration the construction of a plant, to cost about \$1,000,000, for the manufacture of automobiles. William Ginnuth, Temple, is first vice-president.

The Port Arthur Light & Power Co., Port Arthur, will install a water treating plant to cost about \$16,000.

The Atlas Cabinet Co., Dallas, will build a plant at a cost of about \$30,000 for the manufacture of cabinets.

California

SAN FRANCISCO, Dec. 11.

The Pacific Electric Railway Co., Pacific Electric Building, Los Angeles, is having plans prepared for a one-story repair works and car barn at San Bernardino, 100 x 190 ft.

The Safety Welding Apparatus Mfg. Co., Los Angeles, has been incorporated with a capital of \$20,000 by G. B. Morgan, D. C. Roberts, L. S. Coen and M. A. Fleming.

The B. B. Bell Co., Los Angeles, has been incorporated with a capital of \$30,000 by B. B. Bell, E. P. Bell and D. S. Collins, Los Angeles, to manufacture lighting fixtures, etc.

The Board of City Trustees, Anaheim, Cal., will receive bids up to 8 p. m., Dec. 27, for new machinery for the municipal electric plant, including a tandem cross-compound engine, an electric generator, exciter, boilers, pumps, etc. Edward B. Merritt is city clerk.

The World Aircraft & Development Co., San Diego, recently organized, has acquired a four-story building on Sixth Street for an airplane factory. Floyd Smith is president.

The San Diego Bay Shipbuilding Co., San Diego, has been incorporated with a capital of \$1,500,000 to build and operate a yard on San Diego Bay. J. Burris Mitchell, F. A. Barnett and Leonard L. Jones are the incorporators.

The Crown City Sheet Metal Works, Pasadena, has filed notice of organization to operate a plant at 150 West Union Street. Homer H. Justice, 394 South Michigan Avenue, heads the company.

The Butters Chemical Works, Martinez, Cal., has commenced the erection of a plant. A furnace for ore reduc-

tion will be installed. The plant is estimated to cost about \$500,000.

The Detroit Chassis Co., Detroit, Mich., is said to be considering the erection of a plant at Bakersfield, Cal., for the manufacture of trucks.

The Liberty Mfg. Co., Los Angeles, has been incorporated with a capital of \$50,000 by Ralph H. Gibson, C. D. Pollock and Alva D. Blake to manufacture metal emblems, napkins, etc.

The Pacific Northwest

TORLAND, ORE., Dec. 11.

The labor situation in shipbuilding yards in the Columbia River and Puget Sound districts is no longer troublesome. Sufficient workmen are to be had in practically all lines, though there is no oversupply in skilled mechanics. A number of hulls of standard types for the United States Shipping Board have been completed, and the installation of boiler and machinery equipment is under way at several yards. The car shortage has not yet interfered with shipments of Government materials from the lumber mills, but complaints are made that there is a serious shortage of cars for ordinary manufacturing. The demand for spruce lumber has led to many extensions and a number of new mills are under way in Oregon, Washington and Alaska.

The Craig Lumber Co., Craig, Alaska, will install lumber milling equipment with a daily capacity of 50,000 ft. of spruce.

The Loggers' & Contractors' Machinery Co., Portland, has completed the erection of an addition, 60 x 100 ft., which will be equipped for repairing and rebuilding second-hand lumber mill and logging machinery.

Plans have been completed for the reconstruction of the Brown Lumber Co.'s mill at Cottage Grove, Ore., to cost \$50,000. It will have a daily capacity of 75,000 ft. New equipment will be installed.

The Standifer Shipbuilding Co., Portland, has received contracts from the Government for the construction of 10 8800-ton steel vessels, to cost \$16,000,000. It is reported that a site for an additional shipbuilding plant at Vancouver, Wash., has been secured.

The Erickson Shipbuilding Co., Seattle, has completed plans for a machine shop 106 ft. long, power house, blacksmith shop, boiler shop, foundry pattern shop and bolt shop, to cost \$65,000. When completed the plant will cost about \$500,000.

The Carnation Milk Products Co., Seattle, has completed plans for its new plant at Nampa, Idaho, to cost \$175,000, which includes a three-story boiler house, 50 x 100 ft.

John L. Hall, Henry Building, Seattle, and E. L. Skeel have formed the Lake Washington Shipyards Co., which plans the construction of a plant at Houghton, on Lake Washington.

The Boeing Airplane Co., Seattle, has increased its capital stock from \$100,000 to \$500,000 to extend and improve its factory.

The Far West Sales Co., Albany, Ore., will erect a new plant, 40 x 160 ft., which will be the first of four units. It manufactures ladders, wheelbarrows, cedar chests and furniture specialties.

The Concrete Piling Co., formerly of Seward, Neb., plans the installation of a plant in Seattle to cost \$250,000. W. B. Hester is chief engineer. Concrete and concrete sheet piling will be manufactured.

It is announced that the Norway-Pacific Construction & Dry Dock Co., Seattle, will construct a shipbuilding plant in Everett, Wash., at a cost of \$1,500,000, which will employ 3500 men. Five shipways are planned and steel vessels of 8800-ton capacity will be built. M. G. Thomle is president.

Canada

TORONTO, Dec. 15.

Great activity in munitions manufacture is looked for throughout 1918. British renewal orders are being received for 4.5-in. and high explosive shells and shrapnel. The total amount of Imperial expenditures is placed at about \$30,000,000 a month, and covers shipbuilding, munitions, etc. The money subscribed to the Victory Loan will benefit Canadian industries through the expenditure of approximately \$410,000,000, which will be largely utilized for financing British and Canadian war contracts.

The Steel Company of Canada, Hamilton, Ont., is making extensions and improvements representing an outlay of \$150,000.

The Canadian Machine Co., with offices at Nashua, N. H., and Boston, proposes to build a manufacturing plant at Maisonneuve, Que., and has asked the city council to guarantee debentures of the company to the extent of \$250,000.

The Willy-Overland, Ltd., Weston Road, Toronto, contemplates the erection of a factory to cost \$40,000.

The Holden Morgan Co., 579 Richmond Street, West, Toronto, is having plans prepared for the erection of a building to cost \$4,000 to manufacture munitions.

Plans have been drawn for the erection of a new building for the Canadian Fairbanks-Morse, Ltd., 1383 Bloor Street, West, Toronto, to cost \$4,500.

The Vulcan Iron Works, Ltd., Port Douglas, Winnipeg, will build an addition to its plant to cost \$65,000, for which tenders are being received by Woodman & Cubbidge, architects, 302 Lindsay Building.

The Jackson Lewis Co., Ltd., Toronto, has been awarded contract for the erection of an addition to cost \$30,000 to the factory of the Canadian Aeroplane Co., Ltd., Dufferin Street, Toronto.

The Exolon Co., Thorold, Ont., is preparing plans for the erection of an addition to cost \$500,000. Kalmus, Comstock & Westcott are the engineers.

The International Business Machines Co., Ltd., Toronto, has been incorporated with a capital stock of \$2,000,000 and will take over the plants of the International Time Recording Co., Toronto; Dayton Computing Scale Co. and the Hollerith Tabulating Machine Co., Montreal. These companies will be operated under one central management at Toronto, but the branch offices will be continued in every large city in Canada. It is also the intention of the company to develop an export trade, particularly to Australia, New Zealand, South Africa and South America. Thomas J. Watson is president and Frank E. Mutton, 158 Madison Avenue, vice-president. The sales managers are L. A. Davidson for the scale division and St. George Bond for the tabulator division. A new plant will be built in Toronto at an early date.

The (British) Young High-Velocity Carburetor Co., Ltd., Toronto, has been incorporated with a capital stock of \$250,000, by Henry H. Davis, 19 Adelaide Street, East; Edward H. Brower, Lawrence A. Landriau and others, to manufacture carburetors, automobiles, accessories, machinery, etc.

The planing mill owned by Walker & Son, Berge Street, Rosthern, Sask., was destroyed by fire, with a loss of about \$160,000. It will be rebuilt and new machinery and engines purchased.

M. J. O'Brien proposes to build an industrial plant at Arnprior, Ont., and develop waterpower on the Madawaska River, at an expenditure of about \$3,000,000.

The Water Commissioners, Windsor, Ont., have decided to install at once two new powerful electric pumps on account of the shortage of fuel. The present steam installation will be retained for auxiliary purposes.

The Terminal Land Co., Fort William, Ont., has purchased the plant of the Conley Frog & Switch Co., Port Arthur, Ont., which was under construction at the time war broke out but was never completed. The new owners will finish the plant and equip it.

Government Purchases

WASHINGTON, Dec. 17.

Bids will be received by the Bureau of Yards and Docks, Navy Department, until Jan. 7 for furnishing and installing one 40-ton and two 10-ton overhead electric traveling bridge cranes and runway trolley wires on the runways in the extension to the machine shop building, 128, at the navy yard, New York. Drawing and specifications No. 2720 may be obtained from the bureau or from the commandant of the navy yard named.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, Dec. 7, for furnishing material and supplies for the naval service as follows:

Schedule 2337½, Yards and Docks, Class 1, Mare Island—One hydraulic pump with motor—Bid 46, \$18,500 and \$18,050; 55, \$10,300 and \$9,625.

Schedule 2318½, Steam Engineering, Class 21, Brooklyn—Two horizontal boring, drilling and milling machines—Bid 10, \$5,543.75; 21, \$6,325; 31, \$7,310 and \$7,590; 62, \$5,955.50. Class 22, Brooklyn—Two planers—Bid 31, \$8,370 and \$9,050; 54, \$3,950. Class 23, Brooklyn—Two upright drilling machines—Bid 31, \$1,045.

The names of the bidders and the numbers by which they are designated in the above list follow:

Bid 10, Defiance Machine Works, Defiance, Ohio; 21, Hill, Clark & Co., New York; 31, Niles-Bement-Pond Co., New York; 46, Edward J. Smith, New York; 55, Worthington Pump & Machinery Corporation, New York.

Hydraulic Forging Presses

(Continued from page 1480)

Tweddell, R. H.
On the application of direct-acting pressure intensifying apparatus to hydraulic pressure.
Proc. Inst. Mech. Engrs., 1878, pp. 45-66.

1880—Differential accumulator, (designed by K. Heinrich, Prague).
Dingler's Polytechn. Jour., 1880, v. 235, pp. 185-87, (plate 16, figs. 7-13).

1882—Tweddell, R. H.
On machine-tools and other labor-saving appliances, worked by hydraulic pressure.
Min. Proc. Inst. Civil Engrs., 1882, v. 73, part III, pp. 64-78; Appendix (plates 5, 6 and 7), pp. 79-82.

1884—A. Higginson's arrangement of hydraulic machine tools.
German patent 26435, class 47, Sept. 7, 1883.
Dingler's Polytechn. Jour., 1884, v. 252, pp. 313-14.
Jacques, Lieut. W. H.
The establishment of steel gun factories in the U. S. Sir Joseph Whitworth's hydraulic forging press.
Proc. U. S. Naval Inst., 1884, v. X, No. 4, pp. 637-642, (plates XXVII-XXIX).

1886—Augström, C. A.
Om användning af hydraulisk tryck sasom driftkraft för atskilliga i mekaniska verkställer och för jernhandteringen begagnade arbetsmaskiner.
Jernkontorets Annaler 1886, pp. 442-74.
A 4000-ton hydraulic forging press.
Engineering (London), 1886, v. 41, p. 393.
C. Davy's hydraulic forging press, (Description of German patent 34273, May 3, 1885).
Dingler's Polytechn. Jour., 1886, v. 259, pp. 489-93, (plate 32, figs. 10-13).
Zeits. Vereins Deutsch. Ingen., 1886, v. XXX, no. 22, p. 487.
Miscellaneous machinery at the International Inventions Exhibition.
Engineering (London), 1885, Sept. 25, v. 60, pp. 234-35.
Breuer, Schumacher & Co.
Hydraulic forging press.
German patent 37917, May 21, 1886.
Neukirch, Fr. Bremen.
Hydraulic press and lifting machine.
German patent 36580, Class 58.
Zeits. Vereins deutsch. Ingen., 1886, v. XXX, p. 964.

1887—Higginson's forging press with pressure-water operation.
Industries, 1887, Dec. 16, v. III, p. 642.
Dingler's Polytechn. Jour., 1888, v. 267, pp. 342-43.
Boehme, E., Breslau.
Hydraulic differential accumulator.
German patent 38213, class 58.
Zeits. Vereins deutsch. Ing., 1887, v. XXXI, pp. 359-60.
Haniel & Lueg, Düsseldorf-Grafeuberg.
Hydraulic differential press.
German patent 39694, class 58.
Zeits. Vereins deutsch. Ingen., 1887, v. XXXI, p. 896.

1888—Hydraulic tube press, built by Messrs. Henry Bessemer & Co., Sheffield, Eng.
Engineering (London), 1888, Jan. 20, v. 45, p. 75.
Hydraulically operated machine-tools (forging presses).
Zeits. Vereins deutsch. Ingen., 1888, v. XXXII, pp. 941-45.

1889—Gautier, Ferd.
Comparison of forging with the drop-hammer and the hydraulic press.
Bull. Soc. l'Industrie Minérale, 1889, part III, pp. 829-849.
Sellers, Prof. C.
Hydraulic forging machines as compared with the action of the steam hammer.
Stevens Indicator, 1889, Jan., v. VI, pp. 1-14.
Trappen.
Hydraulic forging press.
German patent 53225, Dec. 14, 1889.

1891—Allen, W. D.
The forging press.
Jour. Iron & Steel Inst. (London), 1891, II, pp. 62-66 (plate XIII).
Engineering (London), 1891, v. 52, p. 416.
Stahl u. Eisen, 1891, v. XI, p. 895.

Angström, C. A.
Om nya konstruktioner af hydrauliska smidespressar.
Jernkontorets Annaler, 1891, pp. 463-84 (plates XVI and XVII).
The Prött and Seelhoff compressed air intensifier (accumulator) for hydraulically performed operations (German patent 43434, British patent 8329).
Stahl u. Eisen, 1891, Feb., v. XI, pp. 132-34.
Dingler's Polytechn. Jour., 1891, June 26, v. 280, pp. 289-291.
Demenege.
The 4000-ton press erected by the Compagnie des Forges de Chatillon-Commentry at the Saint-Jacques works, Montluçon.
Génie Civil, 1891, v. XX, pp. 65-71 (14 Figs.).

1892—Daelen, R. M.
High-pressure hydraulic presses in iron works.
Stahl u. Eisen, 1892, v. XII, pp. 155-172 (Illus.); (Transl.) Trans. Amer. Inst. Min. Engrs., 1892-93, v. XXI, pp. 321-345 (Illus.). (Abst.) Z. Vereins deutsche Ingenieure, 1892, v. XXXVI, p. 222.
Prakt. Maschinen-Konstrukteur, 1892, v. XXV, p. 93.
Dufour, C.
Memoir on forging presses.
Bull. Soc. l'Industrie Minérale, 1892, v. VI, pp. 1037-82. (Abst.) Jour. Iron & Steel Inst. (London), 1893, v. 54, No. II, pp. 455-456.
Min. Proc. Inst. Civil Engrs., 1892-1893, vol. 114, pp. 445-47.

1893—Angström, C. A.
Anordning och drift af hydrauliska smidespressar.

Jernkontorets Annaler, 1893, v. IV, pp. 212-214 (plates XIII, XIV, XV).
Hydraulic presses.
Dingler's Polytechn. Jour., 1893, Aug. 11, v. 289, pp. 121-123.
Les presses à forger de Breuer, Schumacher et Cie (presses à course partielle variable).
Portefeuille écon. des machines, 1893, v. 38, p. 129.
Génie Civil, 1893, v. XXIII, p. 411.
Accumulators.
Pressure-water accumulator designed by W. Fagnie-Gallway; the Berry accumulator; piston, the Soles accumulator, the Aiken pressure-water auxiliary accumulator or pressure transmitter (9 Figs.).
Dingler's Polytechn. Jour., 1893, v. 289, pp. 276-78.
The Pearson carwheel forging machine.
THE IRON AGE, 1893, Dec. 7, v. 52, pp. 1015-17.
Biggart, J. L.
The adaptation of hydraulic power in the manufacture of iron and steel.
West of Scotland Iron & Steel Assoc., 1893, Jan. 13, v. 1, pp. 60-73 (plates II-VI).
Davenport, R. W.
Production in the U. S. of heavy steel engine, gun and armor plate forgings.
Soc. Naval Architects & Naval Engrs., 1893, v. 1, pp. 79-89; discussion, pp. 89-90.
THE IRON AGE, 1893, Nov. 23, v. 52, pp. 926-27, 971.
Gomez.
Forging presses.
Bull. Assoc. Ingénieurs sortis de l'Ecole de Liège, 1893.
(Abst.) Jour. Iron & Steel Inst. (London), 1893, v. 54, No. II, pp. 454-55.

1894—Hydraulic shear and forging press with intensifier (Breuer, Schumacher & Co.).
Revue Industrielle, 1894, v. XXV, pp. 334-35.
Maschinenbauer, 1894, v. XXIX, pp. 39-46.
Hydraulic shell plant.
(Constructed by Messrs. Fielding & Platt, Gloucester).
Engineering (London), 1894, Jan. 5, v. 57, p. 12.
The Breuer-Schumacher 1200-ton hydraulic forging press (constructed by Messrs. Greenwood & Batley Ltd., Leeds, Eng.).
Engineering (London), 1894, v. 57, pp. 241-42.
Eng. Min. Jour., 1894, v. 94, p. 293.
Hydraulic forging press with increased final pressure for 350,000 kg. maximum pressure, provided with steam intensifier.
Glaser's Annalen f. Gewerbe und Bauwesen, 1894, Nov. 15, 35, pp. 194-195.
The Morgan 1000-ton forging press, with Blake intensifier.
THE IRON AGE, 1894, v. 54, pp. 741-42 (3 Figs.).
Tweddell, R. H.
Forging by hydraulic pressure.
Min. Proc. Inst. Civil Engrs., 1894, Feb. 20, v. 117, pp. 1-24; discussion, pp. 25-40; correspondence, pp. 41.
(Abst.) Jour. Iron & Steel Inst., 1894, v. 45, No. 1, pp. 539-40.
Stahl u. Eisen, 1894, v. XIV, pp. 900-908.

1895—Recent forging presses.
Dingler's Polytechn. Jour., 1895, v. 297, pp. 249-53.
Buch, J.
The replacement of the rolling mill by steam-hydraulic presses.
Stahl u. Eisen, 1895, Dec. 15, v. XV, pp. 1143.
Jour. Iron & Steel Inst., 1896, v. 49, p. 437.

1896—The manufacture of rods of varying cross-section from Delta metal or other metals by hot pressing in a hydraulic press (Dick process).
Zeits. Vereins deuts. Ingen., 1896, Dec. 5, v. 40, No. 49, pp. 1434-36 (Illus.).
Fielding and Platt's double-powered hydraulic forging press.
Engineer (London), 1896, v. 81, p. 316 (Illus.).
Angström, C. A.
Notes on the construction of hydraulic welding presses.
Jernkontorets Annaler, 1896, v. 51, pp. 23-45.
Jour. Iron & Steel Inst., 1896, v. 50, pp. 370-71.
A 1200-ton bossing and forging press (constructed by Fielding & Platt, Ltd., Gloucester).
Engineering (London), 1896, Aug. 28, v. 62, pp. 273-274.
Bull. Soc. d'Encouragement à l'Industrie Nationale, 1896, p. 1036.
Crozet-Fourneyron, M. E.
Notes on Davy forging presses.
Bull. Soc. de l'Industrie Minérale, 1896, v. X, pp. 589-599.
Porter, H. F. J.
Hollow steel forgings.
Trans. Amer. Soc. Mech. Engrs., 1896, May 19, v. XVII, pp. 359-371.
Uhlund's Techn. Rundschau, 1897, v. V, p. 55.

1897—Machines for forging rolling, bending and drawing.
Dingler's Polytechn. Jour., 1897, v. 303, No. 1, pp. 11-12.
Vickers' Works at Sheffield—8000-ton hydraulic forging press.
Engineering (London), 1897, Nov. 5, v. 64, pp. 555-57.
Davenport, R. W.
Steel for marine engine forgings and shafting.
Cassier's Magazine, 1897, Aug., v. XII, pp. 513-530.
Ellington, E. B.
The transmission of power by water.
Engineer (London), 1897, v. 83, p. 535.
Engineering (London), 1897, v. 63, pp. 710 and 728.
Electrician, 1897, v. 39, pp. 148-49.
Meyer, B.
Steam-hydraulic presses in place of shingling hammers.
Stahl u. Eisen 1897 XVII, pp. 257-261 (1 Illustr.).
(Abst.) J. Iron & Steel Inst. 1897, v. 51, p. 491.
Gledhill armor-plate forging press.
Bull. Soc. d'Encour. pour l'Ind. Nat., 1898, v. 37, pp. 92-94.
Vickers 8000-ton forging press.

Génie Civil, 1898-99, v. XXXIV, pp. 184-85.
Oester. Zeits. f. Berg-u. Hüttenwesen, 1899, v. 47, pp. 160-61.
 The construction of modern wire-wound ordnance.
 No. III: Hydraulic forging press engines, Southgate Engineering Co., Ltd., 3000-ton hydraulic forging plant.
Engineering (London), 1898, v. 85, pp. 100-102.
 The Watson-Stillman 500-ton hydraulic press.
THE IRON AGE, 1898, Jan. 27, v. 61, p. 11.
 Hydraulic forging, designed by A. Borsig, Berlin.
Dingler's Polytechn. Jour., 1898, v. 307, No. 6, pp. 123-130 (2 illustr.).
 Presses for forging and bending.
Dingler's Polytechn. Jour., 1898, v. 310, No. 7, pp. 130-32, 144-47, 168-73.
 Daelen, R. M.
 The operation of forging presses (steam-pressure diagram).
Zeits. Vereins deutsch. Ingen., 1898, v. 42, p. 732.
Stahl u. Eisen, 1898, Apr. 1, v. 18, pp. 314-317.
 (Abst.) *Jour. Iron & Steel Inst.*, 1898, v. 54, p. 488.
 Daelen, R. M.
 The use of presses instead of steam-hammers in welding iron.
Stahl u. Eisen, 1898, v. 18, pp. 314-317 (9 illustr.).
Jour. Iron & Steel Inst., 1898, v. 53, pp. 481-82.
 Haniel & Lueg.
 British patent 24540, 1898.
 Menne.
 Operation of forging presses.
Uhland's techn. Rundschau, 1898, group 1, pp. 81-82.

1899—Large forging presses.
Stahl u. Eisen, 1899, v. XIX, pp. 606-07.
 The production and supply of armor for naval purposes. IV. Plant and processes employed—forging presses.
Iron and Coal Trades Rev., 1899, v. 58, pp. 195-197.
 (Abst.) *Jour. Iron & Steel Inst.*, 1899, v. 55, p. 395.
 A large forging-press.
Prometheus, 1899, v. X, pp. 693-96, No. 512.

1900—A 10,000-ton forging press at the Obouhoff works.
Iron and Coal Trades Rev., 1900, v. 60, pp. 502-03.
 Forging press. Rice system.
Revue Industrielle, 1900, v. XXXI, pp. 114-15 (Illus.).
 Torchio da 9000 t per lavorare i metalli.
Revista di artiglieria e genio (Rome), 1900, v. III, pp. 301-303.
 Musiol, K.
 The theory and practice of drawing in drawing presses.
Dingler's Polytechn. Jour., 1900, v. 315, No. 28, pp. 442-47.
 Sellers, C.
 The progress of the mechanical arts in three-quarters of a century.
Jour. Franklin Inst., 1900, v. 149, pp. 5-25.

1901—Paris International Exposition, 1900.
 Hydraulic forging press and hydraulic shear exhibited by the Kalker Werkzeugmaschinen fabrik Breuer, Schumacher & Co., Akt.-Ges., Kalk. Glaser's Annalen f. Gewerbe u. Bauwesen, 1901, v. 48, No. 565, pp. 17-19.
Zeits. Vereins deutscher Ingen., 1901, v. 45, pp. 630-631.
 Daelen.
 Use of hydraulic power in the manufacture of iron and steel.
Jour. Iron & Steel Inst., 1901, v. 59, pp. 146-157.
Z. Werkzeugmaschinen, 1901, v. V, pp. 433-35.
Stahl u. Eisen, 1901, v. XXI, pp. 749-753.

1902—Fischer, H.
 Machine-tools at the Düsseldorf Industrial Exposition, 1902. Two hydraulic forging presses. Four drawing presses (German patent 104931).
Zeits. d. Vereins deutsch. Ingen., 1902, v. 46, No. 37, pp. 1389-90, 1508 (Fig. 12), 1200-ton Breuer & Schumacher forging press.
 Volk, C.
 Hydraulic welding presses shown at the Düsseldorf Exhibition.
Oesterr. Zeits. f. Berg-u. Hüttenwesen, 1902, v. 50, p. 568 (Illustr.).
 Willaredt, A.
 Electric turning device for hammers and presses.
Stahl u. Eisen, 1902, v. 22, pp. 380-384, (5 illustr.).

1903—Ten-thousand-ton press at the Düsseldorf Exhibition.
American Machinist, 1903, Feb. 26, v. XXVI, p. 298.
 Borsig's works in Germany: Hydraulic forging press.
Engineering (London), 1903, Oct. 26, v. 76, pp. 551-52.
 Bull. Soc. d'Encouragement pour l'Industrie Nationale, 1903, v. 105, pp. 848-851.
 The Schoen solid forged and rolled steel wheel-double-acting hydraulic wheel forging press.
Railway Age Gazette (N. Y.), 1903, June 19, v. XXXV, pp. 438-39 (4 Figs.).
 Hydraulic machinery for an Indian locomotive works.
Engineering (London), 1903, Jan. 2, v. 95, pp. 10-11.
 Mercader, C.
 Hollow-pressed axles.
Jour. Iron & Steel Inst., 1903, May 7, v. 63, pp. 95-123; discussion, pp. 124-135.
Zeits. Vereins deutscher Ingenieure, 1903, May 16, v. 47, No. 20, pp. 702-09.

1904—An Austrian 1200-ton steam-hydraulic press.
Sci. Amer. Suppl., 1904, Jan. 30, v. 57, No. 1465, pp. 23473-74.
 Steam-hydraulic forging press (constructed by Breuer, Schumacher & Co., Kalk-Cologne).
Engineering (London), 1904, May 13, v. 77, p. 677.
 High-speed hydraulic forging-press (constructed by Davy Bros., Ltd., Sheffield).
Engineering (London), 1904, Nov. 11, v. 78, pp. 642.
 Calculations for the design of a hydraulic press for a pressure of 150,000 kg. and a water pressure of 300 atmospheres.
Zeits. f. Elektrotechnik u. Maschinenbau, 1904, v. VII, pp. 47-49.
 The Stratton four-way valve for hydraulic presses.

Practical Engineer, 1904, July 1, v. XXX, pp. 16-17.
 The Huber hydraulic press at the World's Fair.
THE IRON AGE, 1904, Oct. 27, v. 74, pp. 5-7.
 Hydraulic forging press with auxiliary steam cylinder.
Génie Civil, 1904, v. 45, pp. 99-100 (Illustr.).
 Control valve for hydraulic presses.
 Der Prakt. Masch.-Konstr., 1904, v. XXXVII, p. 40.
 The domain of applicability of hydraulic forging presses.
Techn. Rundschau, 1904, pp. 621-22.
 Flanagan, G. E.
 Notes on the design of hydraulic intensifiers.
American Machinist, 1904, Oct. 20, v. XXVII, pp. 1392-1393.
Mechanical World, 1904, v. XXXVI, p. 270.
 Loss, H. V. von.
 The manufacture of hydraulically forged and rolled solid steel railway wheels.
Jour. Franklin Inst., 1904, v. 157, pp. 333-354.
 (Plate 1: 5000-ton hydraulic forging press).
 Morey, W. E.
 Design of a 4000-ton hydraulic press.
American Machinist, 1904, Nov. 17, v. XXVII, pp. 1526-1530.
 Petch, A. F.
 British hydraulic machinery.
Cassier's Magazine, 1904, v. XVII, pp. 12-25.
 Peter.
 Notes on the installation of forging presses.
Glaser's Annalen, 1904, Aug. 15, v. 55, pp. 61-69.
 1905—100-ton hydraulic forging press (by the Vauxhall & West Hydraulic Engineering Co.).
Page's Engineering Weekly, 1905, July 5, v. VII, p. 25 (Illustr.).
 The Hughes hydraulic billet press.
THE IRON AGE, 1905, Jan. 19, v. 75, pp. 223-25.
 A new system for operating hydraulic machinery.
THE IRON AGE, 1905, March 9, v. 75, p. 834.
 Baker, J. H.
 Forging machinery.
Mechanical World, 1905, April 14, v. 37, p. 177.
 Domozyay, L.
 The action of the forging press and the deformation of a metal when compressed hot.
Revue de Métallurgie 1905, v. II, pp. 277-296.
 (Abst.) *Jour. Iron & Steel Inst.*, 1905-11, v. 68, pp. 706-07.
 Fischer, H.
 Die Werkzeugmaschinen.
 1905, 2d Ed., Berlin. Verlag von Julius Springer, v. I: Die Metallbearbeitungs Maschinen, pp. 656-685.
 Perkins, F. C.
 Heavy German shears and presses.
THE IRON AGE, 1905, Aug. 17, v. 76, pp. 397-400.
 Somers, F.
 The manufacture of forgings, with a description of a hydraulic pressing plant.
 Paper read before the Staffordshire Iron and Steel Inst., 1905, Dec. 9, v. XXI, pp. 17-22.
Iron and Coal Trades Rev., 1905, v. 71, pp. 2025-26.
 Steele, F. W.
 Design and work of hydraulic pressing, stamping, forging and similar machinery.
Liverpool Engineering Society, 1905, Jan. 25, v. XXVI, pp. 97-114; discussion, pp. 115-16 (plate No. 1).
Page's Engineering Weekly, 1905, v. VI, pp. 263-64, 318-19.
 (Abst.) *Jour. Iron & Steel Inst. (London)*, 1906/1 v. 69, p. 425.
 1906—150-ton rapid-action forging press.
Engineering (London), 1906, Jan. 12, v. 81, p. 48.
 A new steam-hydraulic forging press.
Stahl u. Eisen, 1906, v. XXVI, pp. 217-18, (2 Illustr.).
 Combined steam and hydraulic forging press.
Practical Engineering (London), 1906, Aug. 10, v. XXXIV, pp. 176-179; 203-06.
 The seamless pressed steel bath-tub.
 Description of the processes used by the Seamless Pressed Steel Bathtub Co., Detroit.
THE IRON AGE, 1906, v. 78, pp. 923-29 (12 Illustr.).
 A 600-ton 90-in. hydraulic wheel press.
Railway Age Gazette (N. Y.), 1906, Sept. 28, v. 41, p. 273 (Illustr.).
 Japanese railway tire works at Yawata—1200-ton hydraulic press.
Engineering (London), 1906, v. 82, pp. 520-23 (12 Illustr.).
 Capron, A. J.
 Forging presses.
Proc. Cleveland Inst. Engrs., 1906, pp. 137-162.
Jour. Iron & Steel Inst., v. 69, April 27, v. 101, pp. 428-30.
 1907—The Sack steam-hydraulic forging press.
Iron and Coal Trades Review, 1907, May 24, v. 74, p. 1847.
 Steam-hydraulic forging presses instead of small and medium-sized steam hammers.
Stahl u. Eisen, 1907, Jan. 23, v. XXVII, pp. 140-142.
 Improvements in steam-hydraulic forging presses.
Stahl u. Eisen, 1907, March 13, v. 27, pp. 384-86.
 Bräcke.
 Forging presses.
Bihang till Jern-Konterets Annaier, 1907, v. VIII, pp. 670-681.
 Horton, J.
 A large forging press at Halesowen, England.
Iron Trade Review, 1907, v. 40, pp. 951-54 (8 Figs.).
 Lea, F. C.
 Hydraulics.
 New York: Longmans, Green & Co., 1907, 2d ed., chapter XI: Hydraulic Machines, pp. 485-501.
 Peter.
 Recent improvements in the construction of steam-hydraulic presses.
Glasser's Annalen, 1907, Oct. 15, v. 61, pp. 153-157.
Stahl u. Eisen, 1907, v. XXVII, pp. 384-86.
 Roessler, von.
 Compressibility of forging-press water.
Stahl u. Eisen, 1907, June 5, v. XXVII, pp. 308-09.
 Watt, J.
 A large hydraulic forging machine.

American Machinist, 1907, June 20, v. XXX, pp. 886-87.

1908—The Davy combined steam and hydraulic forging press.
Practical Engineer, 1908, March 20, v. XXXVII, pp. 355-57.

The works of Messrs. Walter Somers & Co., Ltd., Halesowen, 3800-ton steam-hydraulic forging press.
Iron and Coal Trades Review, 1908, v. 76, pp. 2479-80 (Illustr.).

Hydraulic forging press.
Mechanical Engineer, 1908, v. XXI, pp. 518-20.

Gibson, A. H.
 Water hammer in hydraulic pipe lines.
 Being a theoretical and experimental investigation of the rise or fall in pressure in a pipe line, caused by the gradual or sudden closing or opening of a valve.
 London, 1908, Arch. Constable & Co., Ltd., 60 pp., with an appended bibliography.

Lichte, H. F.
 Rapid hydraulic swaging and forging press.
Giesseerei Ztg., 1908, v. V, pp. 429-431.

Witham, W. J.
 A large flanging press for boiler sheets.
American Machinist, 1908, April 30, v. 31, pt. 1, pp. 682-84.

1909—High-speed hydraulic forging presses.
American Machinist, 1909, v. XXXII, pt. 1, pp. 628-630 (2 Figs.).
 New 4000-ton Watson-Stillman hydraulic press.
Canadian Machinery, 1909, June, v. V, p. 46.
 The Bliss compound pneumatic forging hammer.
THE IRON AGE, 1909, v. 84, pp. 24-26 (5 Figs.).
 600-ton hydraulic flanging press (built by Henry Berry & Co., Ltd., Leeds).
Engineering (London), 1909, v. 107, p. 173 (Illustr.).

Browning, B.
 Hydraulic forging.
American Machinist, 1909, v. XXXII, pt. 1, p. 705.

Etchells, A.
 Hydraulic machinery and appliances.
Manchester Assoc. Engrs., 1909/1910, pp. 377-414.
Engineering Review, 1910, v. XXII, pp. 313-314.

1910—A high-speed hydraulic forging press having single-lever control.
THE IRON AGE, 1910, v. 85, pp. 1576-78 (Illustr.).
 High-speed forging press.
Met. and Chem. Engng., 1910, v. VIII, pp. 505-06.
 Hydraulic high-speed forging press (Davy press), built by United Engng. & Foundry Co.
Iron Trade Review, 1910, v. 47, pp. 132-135 (7 Figs.).

Browning, R.
 Hydraulic forging methods.
American Machinist, 1910, v. XXXIII, pt. 1, pp. 135-137.

1911—Steam hydraulic forging press. (Fielding & Platt, Ltd., Gloucester.)
Engineer (London), 1911, v. III, p. 553 (Illustr.).
 New 5000-ton forging press at Terni, Italy.
Engineering (London), 1911, v. 112, pp. 312-314.
 A German steam-hydraulic forging press (built by Haniel & Lueg, Düsseldorf).
Iron Trade Review, 1911, v. 48, pp. 147-149.

Ellis, F. J.
 Mechanical and hydraulic presses.
Proc. Engr's Soc. of Western Pennsylvania, 1911, v. XXVII, pp. 152-186.

Gerdau, B. and Mesta G.
 Power forging, with special reference to steam-hydraulic forging presses.
Jour. Amer. Soc. Mech. Engrs., 1911, v. XXXIII, pp. 791-801.

Harbord, F. W. and Hall, J. W.
 The metallurgy of steel.
 1911, London, Chas. Griffin & Co., Ltd.; 4th Ed., v. II; The mechanical treatment, pp. 853-883.

Lohse, U.
 New hydraulic forming press.
Stahl u. Eisen, 1911, v. XXXI, pp. 1414-16.

Macka.
 Hydraulic single-step forging presses.
Oester. Zeitschrift f. Berg-u. Hüttenwesen, 1911, v. 59, pp. 541-550.

1912—Hofmann, F. J.
 Hydraulic forging presses.
 Berlin, 1912, Verlag von J. Springer, pp. 59.

Macka, W.
 Hydraulic single-step forging presses.
Oester. Zeitschrift f. Berg-u. Hüttenwesen, 1912, v. 60, pp. 689-93, 701-05, 719-23, 729-35.

Varela, J. B.
 Design of a hydraulic intensifier.
Machinery, 1912, Sept., v. XIX, pp. 28-30.

1913—A hydraulic bulldozer for heavy forgings (for use in the manufacture of heavy motor truck axles, designed by the Watson-Stillman Co.).
THE IRON AGE, 1913, Feb. 13, v. 91, p. 423.
 A 500-ton inverted hydraulic press (for straightening steel castings).
Iron Trade Review, 1913, Dec. 25, v. 53, p. 1149.

Capron, A. J.
 The application of forging presses.
Jour. West. of Scotland Iron & Steel Inst., 1913-1914, v. XXI, pp. 120-153.

1913—Hofman, H. O.
 General metallurgy.
 1913, McGraw-Hill Book Co., pp. 681-84.

1914—The Schnicke operating valve for hydraulic machinery. (Placed on the market by the Schutte & Koerting Co., Philadelphia.)
THE IRON AGE, 1914, July 16, v. 94, p. 151.
 Hydraulic broaching and forging press (developed by the Hydraulic Press Mfg. Co., Mt. Gilead, Ohio).
THE IRON AGE, 1914, Oct. 29, v. 94, p. 1004 (Illustr.).
 2000-ton tire forging-press (built by Davy Bros., Ltd.).
Engineering (London), 1914, v. 118, p. 539.

Kreuser, A.
 On water admission steering gear for high-speed no-load presses and their investigation by means of no-load diagrams.
Stahl u. Eisen, 1914, June 18, v. 34, No. 25, pp. 1043-47 (13 Figs.).
 (Abst.) *Jour. Amer. Soc. Mech. Engrs.*, 1914, v. 26, pp. 0159-0160.

Philp, C. von.
 A 10,000-ton hydraulic forging press (designed and built by the Bethlehem Steel Co.).
THE IRON AGE, 1914, v. 93, pp. 713-719.

Riedel, F.
 Determination of the power-requirements of forging presses.
Stahl u. Eisen, 1914, v. XXIV, pp. 19-22.

1915—Hydraulic shrapnel billet piercing press (developed by the Hydraulic Press Mfg. Co., Mount Gilead, Ohio).
Machinery, 1915, April, v. XXI, pp. 682-683.
 A 1000-ton hydraulic cartridge case heading press.
Metal Industry, Dec., 1915 (N. S.), v. 13, pp. 516-17.

Capron, A. J.
 Recent progress and present status of the art of forging with special reference to the use of quick-acting forging presses.
Trans. International Engng. Congress, San Francisco, 1915, paper No. 116.
Mechanical Engineering, p. 51.
Iron and Coal Trades Review, 1915, v. 91, p. 509.
Jour. Iron & Steel Inst., 1915, v. 92, p. 287.
Iron Trades Review, 1915, Oct. 7, v. 57, pp. 683-85.
THE IRON AGE, 1915, Nov. 25, v. 96, pp. 1224-25.

Fischer, H. E.
 Contributions to the history of machine tools.
 Forging machines.
Beiträge zur Geschichte der Technik und Industrie-Jahrbuch des Vereins Deutscher Ingenieure, herausgegeben von Conrad Matschoss, 1915, Berlin: Verlag von Julius Springer, v. VI, pp. 24-31; hydraulic forging presses.

Gibson, A. H.
 Hydraulics and its applications.
 New York, D. Van Nostrand Co., 25 Park Place, 1915, pp. 710-727.
 Chapter XX: The hydraulic transmission of energy—Accumulators—Intensifiers. Friction of leather collars for rains, pp. 864-772.

Philp, C. von.
 Forgings from early times until the present.
Trans. Intern. Engng. Congress, San Francisco, 1915.
Mechanical Engineering, paper No. 117, pp. 69-80; discussion, pp. 81-82.

Rodger, Wm.
 Hydraulic presses vs. power presses for the manufacture of cartridges and shells.
Canadian Railway Club, 1915, Sept. 14, v. XIV, pp. 16-34.
Jour. Amer. Soc. Mech. Engrs., 1915, v. XXXVII, pp. 612-613.

Tupper, C. A.
 Equipment for forging shrapnel cases.
THE IRON AGE, 1915, Sept. 2, v. 96, pp. 512-14.

1916—Inverted hydraulic forging press.
Machinery, 1916, June, v. 22, pp. 915-16.
 Motor-driven hydraulic forging press (developed by the Hydraulic Press Mfg. Co., Mount Gilead, Ohio).
Iron Trade Review, 1916, June 8, v. 58, p. 1267.
 A 2000-ton billet extrusion press (built by the Southwark Foundry & Machine Co.).
THE IRON AGE, 1916, April 13, v. 97, p. 889 (Illustr.).
 Capable of exerting a pressure of 4000 lb. per sq. in. and turning out 30 billets 5 in. in diameter and 25 in. long per hr.
 A 1000-ton hydraulic press for briquetting metal borings (developed by the Hydraulic Press Mfg. Co., Mount Gilead, Ohio).
Engineering Record, 1916, Oct. 14, v. 74, p. 486.
THE IRON AGE, 1916, Oct. 5, v. 98, p. 753 (Illustr.).
Iron Trade Review, 1916, Oct. 6, v. 59, p. 688.
Railway Mechanical Engineer, 1916, v. 90, p. 539.
 Friedmann, H.
 Design for hydraulic presses.
Machinery, 1916, May, v. 22, pp. 783-87 (diagram).
 Mylins, A.
 Time required in steam-hydraulic forging.
Uralian Engineer (Uralskiy Tekhnich) 1916, April-May, v. X, No. 4-5, 8 pp., one plate of drawings.
Jour. Amer. Soc. Mech. Engrs., 1916, Sept., v. XXXVIII, p. 758.
THE IRON AGE, 1916, Sept. 21, v. 98, p. 635.

Prentiss, F. L.
 Hydraulic system in modern shell plant.
 Pumping equipment and other notable features in new shop of Hydraulic Pressed Steel Co., Cleveland.
THE IRON AGE, 1916, Aug. 3, v. 98, pp. 232-233.

Smith, G. R.
 Drawing metal by hydraulic method.
Iron Trade Review, 1916, Aug. 3, v. 59, p. 213.

1917—Smith, G. R.
 New process of hydraulic shell drawing.
American Machinist, 1917, Jan. 4, v. 46, pp. 27-29.
 Strombeck, G. M.
 Simple hydraulic intensifier for use on a band press.
American Machinist, 1917, March 8, v. 46, p. 429.
 Thomas, W. A.
 Hydraulic and like presses.
 British patent 104824, Aug. 12, 1916.
 Illus. Offic. Jour., 1917, May 9, No. 1477, p. 826.
 Jerie, Ing. G. D.
 Pumpen, Gebläse und Pressen.
 Berlin, C. W. & S. Loewenthal, pp. 398-402.
 (Vol. IV of Uhlund's Handbuch für den praktischen Maschinenkonstrukteur, 2d edition.)
 Forging shells by process of forming hollow forgings patented by E. H. Steedman, St. Louis, Mo.
The Iron Age, 1917; July 5, v. 100, pp. 1-8 (13 Illustr.); July 26, v. 100, pp. 183-188 (10 Illustr.).

